Atlas de Morfologia Microscópica

Paulo Antônio Padovan - Cordenador

Editora Universitária

Apresentação

O ATLAS DE MORFOLOGIA MICROSCÓPICA é o resultado dos trabalhos da equipe de Biologia Celular do Depto. de Histologia e Embriologia, com o intuito de aprimorar o ensino da disciplina, adicionando mais um recurso, na atualidade, não disponível aos nossos alunos.

O ATLAS DE MORFOLOGIA MICROSCÓPICA consta de uma série de fotomicrografias e eletromicrografias. As primeiras, obtidas diretamente das preparações histológicas que são utilizadas diariamente pelos estudantes nas salas de aulas práticas, fotografadas no fotomicroscópio Zeiss, objetivas plan-acromáticas10X ou 40X, ocular 5X com filme Fuji 100 ASA. As eletromicrografias são de uma coletânea de trabalhos que participamos com professores do CCB/UFPE, de outros Centros e mesmo de outras IES, do país e do exterior, durante o período em que fomos responsáveis pelo Setor de Microscopia Eletrônica do LIKA.

O ATLAS DE MORFOLOGIA MICROSCÓPICA será utilizado EXCLUSIVAMENTE nos laboratórios de Microscopia Óptica do Depto. de Histologia e Embriologia, como parte de uma nova proposta para o magistério da disciplina de Biologia Celular, constando de:

1. aulas teóricas expositivas de cada tópico da disciplina, complementadas com projeções de diapositivos e/ou transparências;

2. aulas práticas correspondentes a cada um dos tópicos teóricos ministrados, constando de:

2.1- apresentação das preparações histológicas de cada aula, em sistema de vídeo-imagem;

2.2- estudo das preparações histológicas ao microscópio óptico, por cada par de estudantes;

2.3- desenho de cada preparação histológica para fixação das imagens;

2.4- concomitantemente à analise das preparações histológicas, consulta do ATLAS DE MORFOLOGIA MICROSCÓPICA para auxiliar e/ou confirmar o aprendizado das preparações histológicas, bem como, compará-las com eletromicrografias pertinentes.

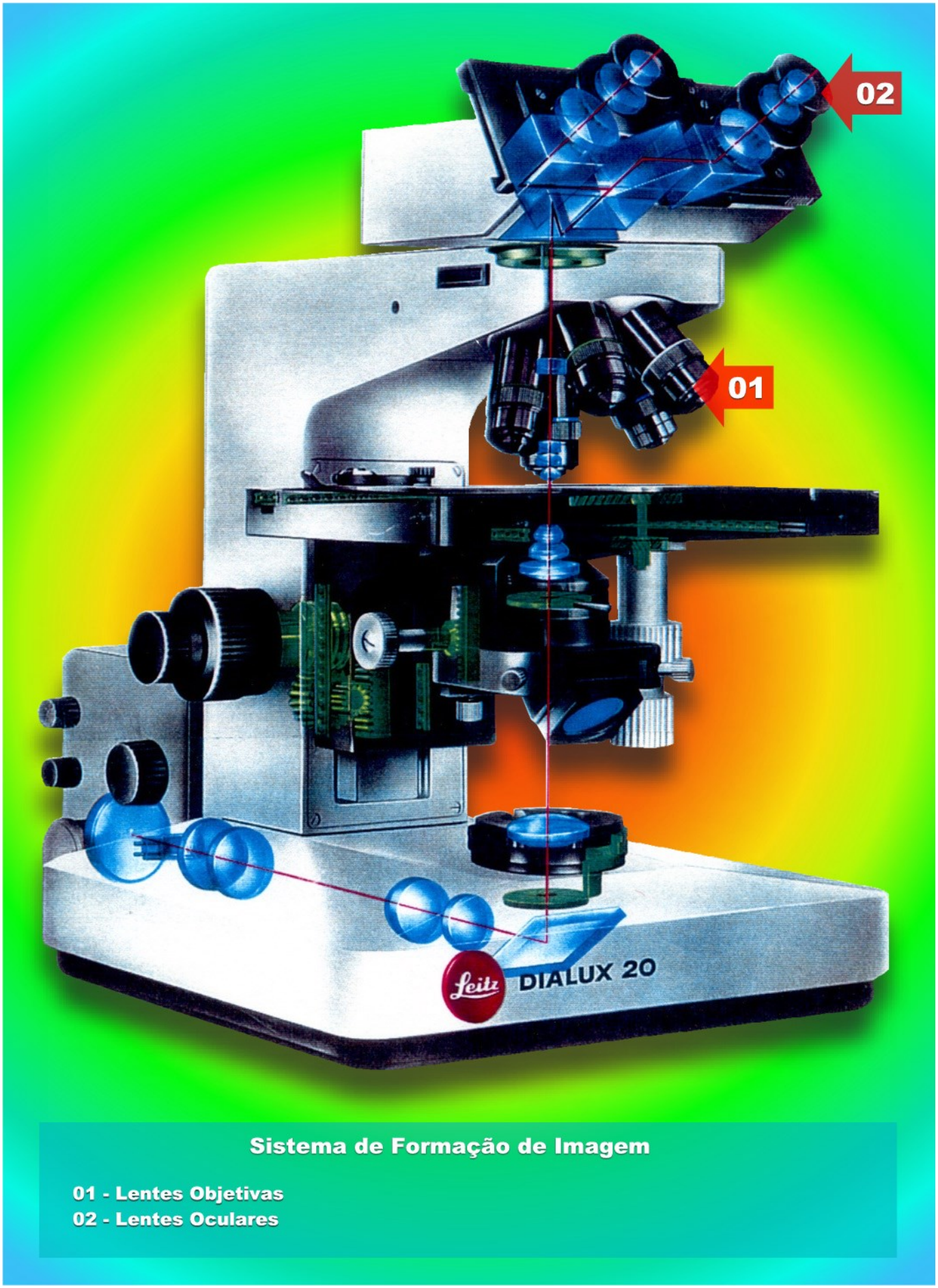
As imagens impressas no ATLAS DE MORFOLOGIA MICROSCÓPICA foram gravadas em CD-Rom, estando disponível no Laboratório de Informática do Depto. de Histologia e Embriologia, para os estudantes revisarem a disciplina, quando necessário.

Assim, estamos certos de que o ATLAS DE MORFOLOGIA MICROSCÓPICA será de fundamental importância para os estudantes da Área III, dentro da nova proposta de magistério da disciplina Biologia Celular, que apresentamos.

Prof. Dr. Paulo Antônio Padovan

Coordenador

Microscópio Óptico - Leitz Dialux 20



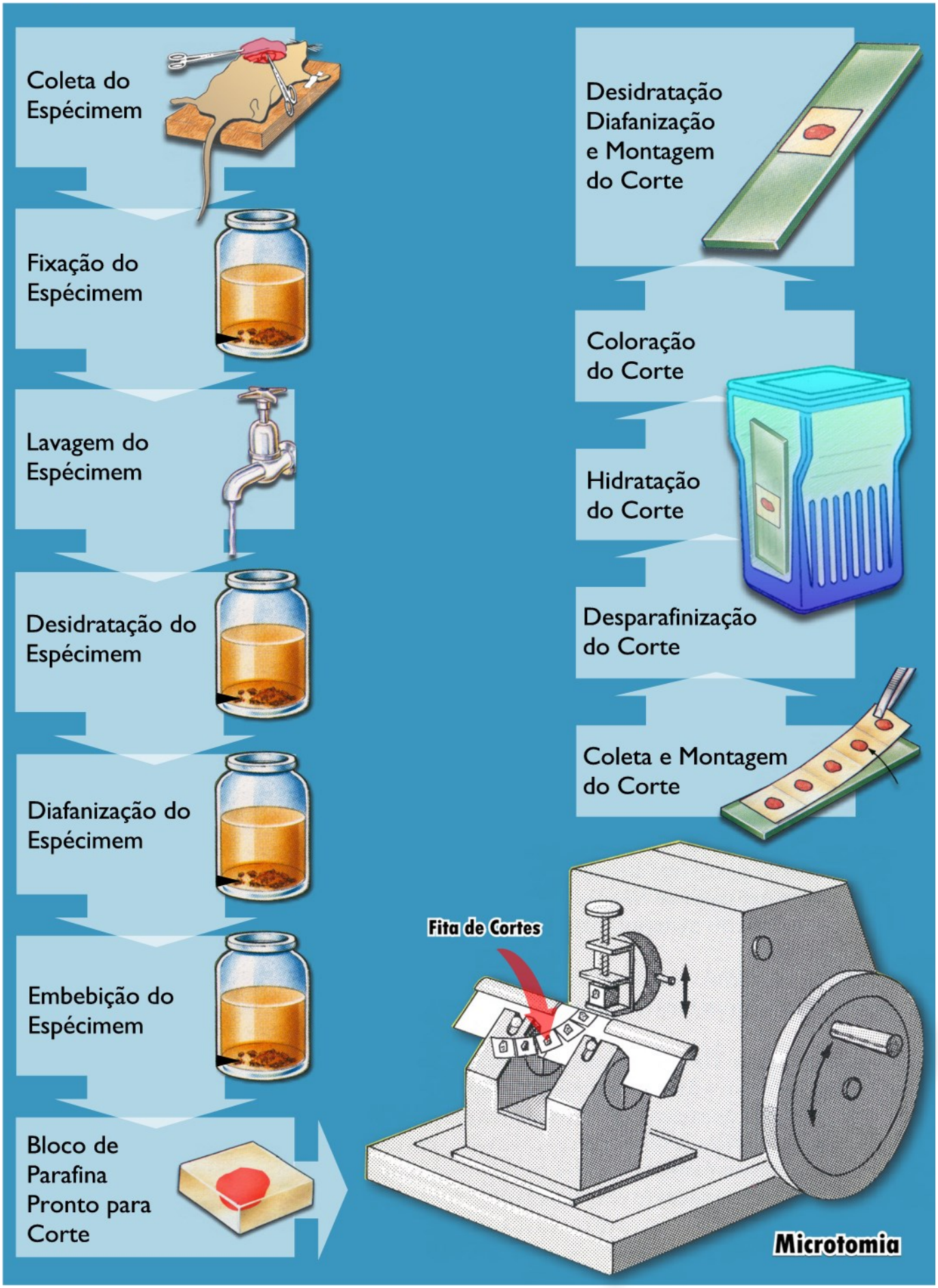
Sistema de Formação de Imagem

01 - Lentes Objetivas
02 - Lentes Oculares

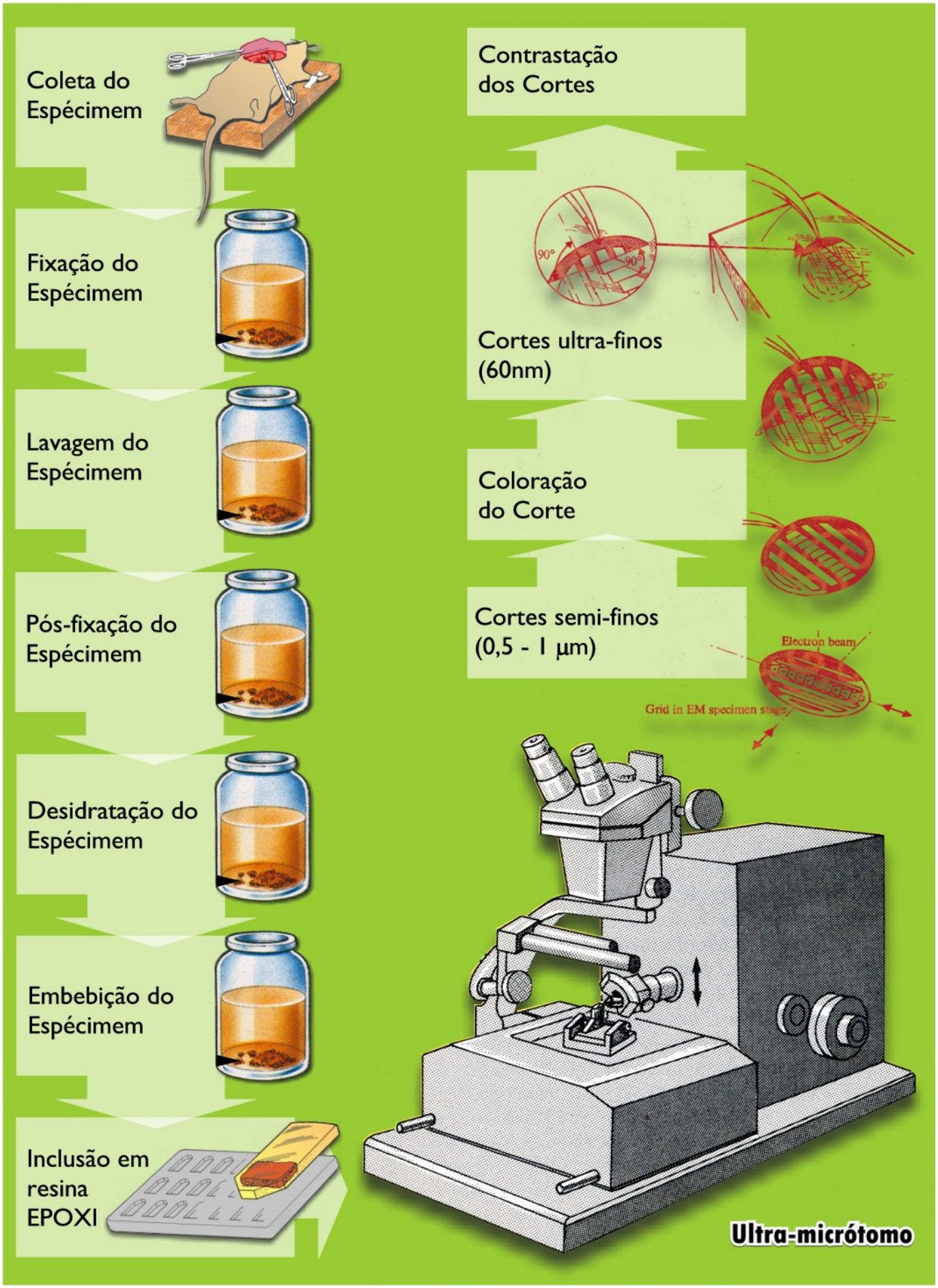
Microscópio Eletrônico de Transmissão - JEOL 1010

Microscópio Eletrônico de Varredura JEOL 5410LV

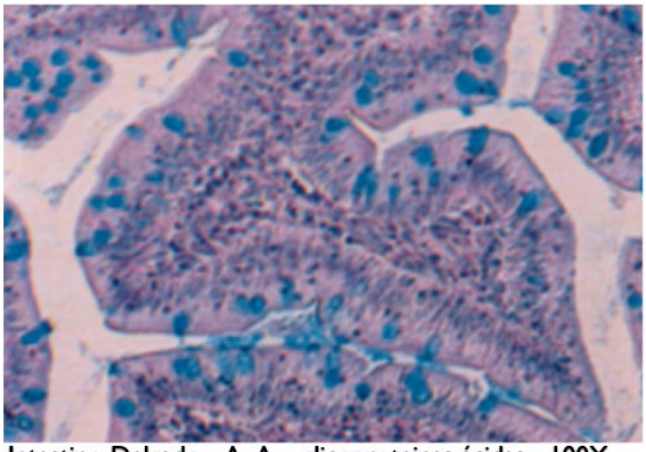
Etapas do Processamento de Material Biológico para Inclusão e Corte em Parafina e Posterior Análise ao Microscópio Óptico



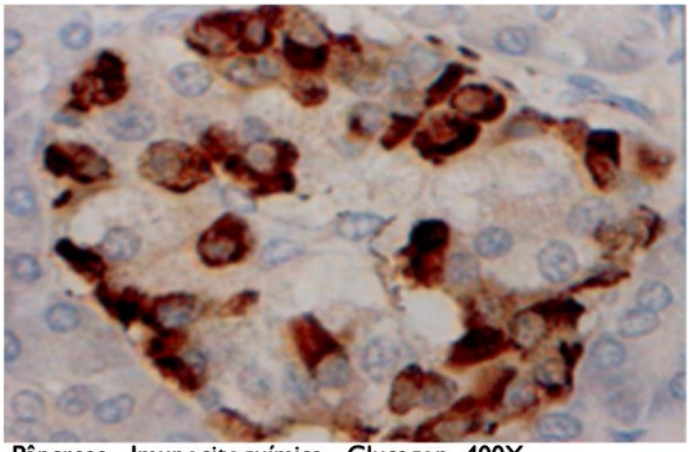
Etapas do Processamento de Material Biológico para Inclusão e Corte em Resina para Posterior Análise ao Microscópio Eletrônico de Transmissão



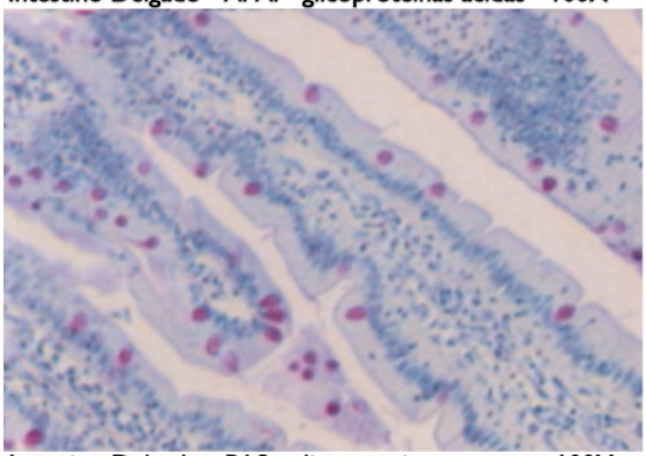
Citoquímica



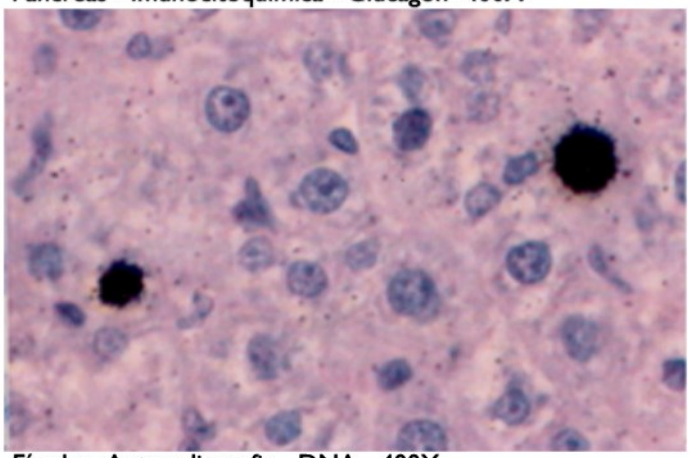
Intestino Delgado - A. A. - glicoproteinas ácidas - 100X



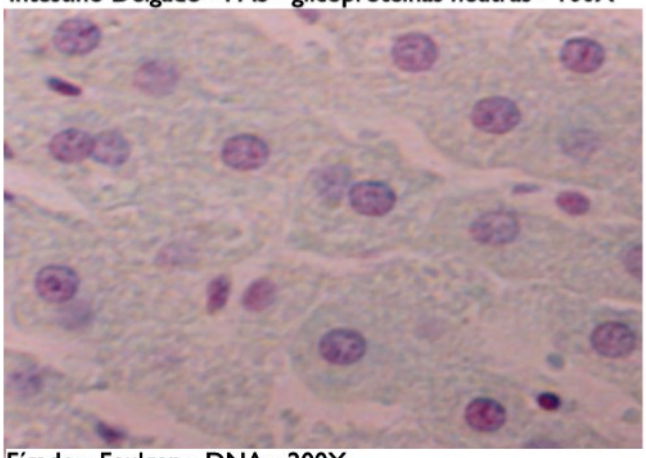
Pâncreas - Imunocitoquímica - Glucagon- 400X



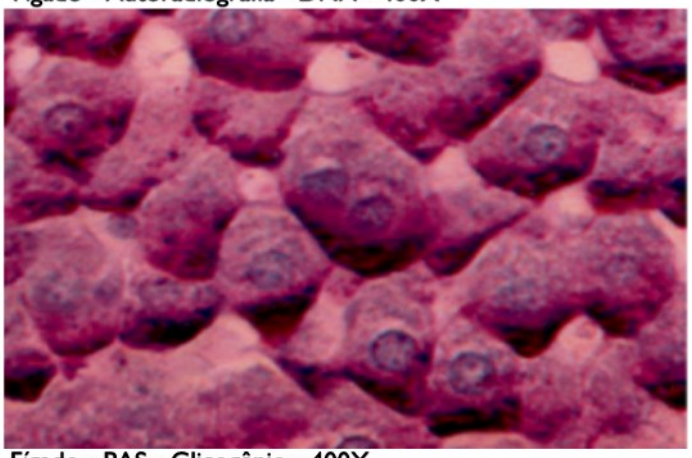
Intestino Delgado - PAS - glicoproteinas neutras - 100X



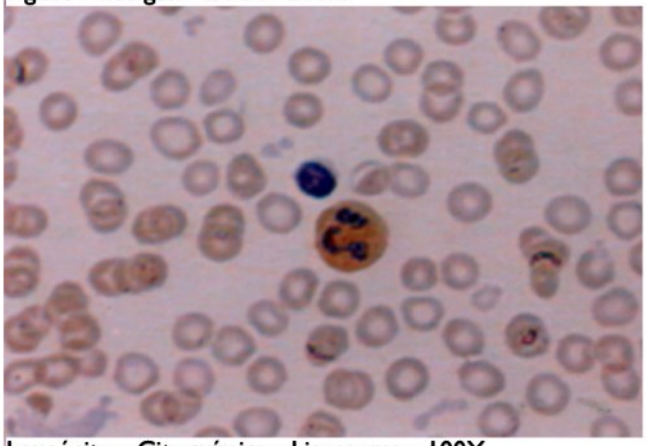
Fígado - Autoradiografia - DNA - 400X



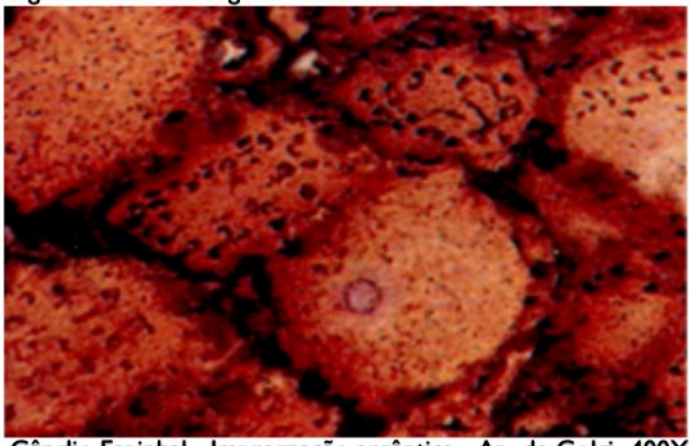
Fígado - Feulgen - DNA - 200X



Fígado - PAS - Glicogênio - 400X

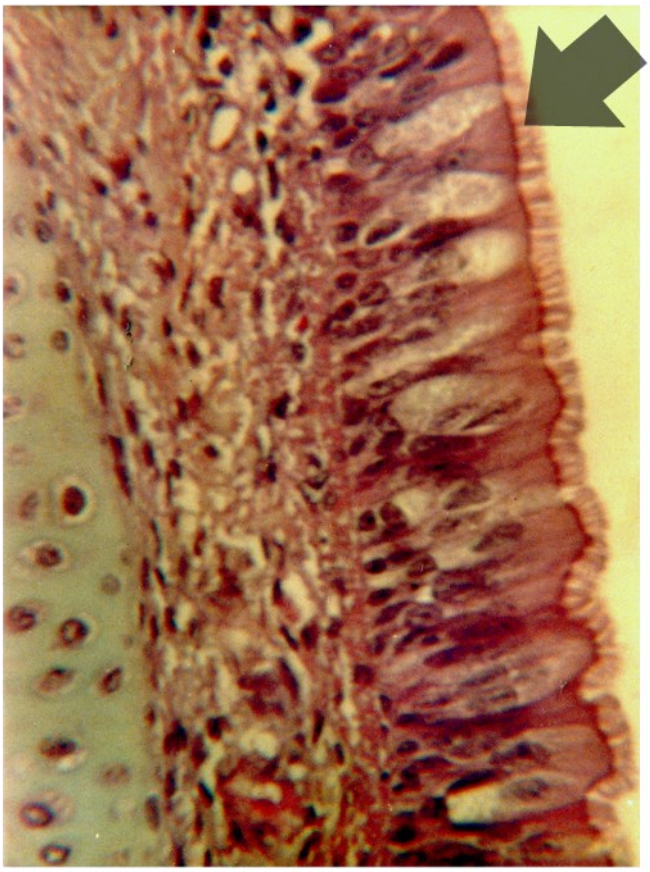


Leucócito - Citoquímica - Lisossoma - 100X

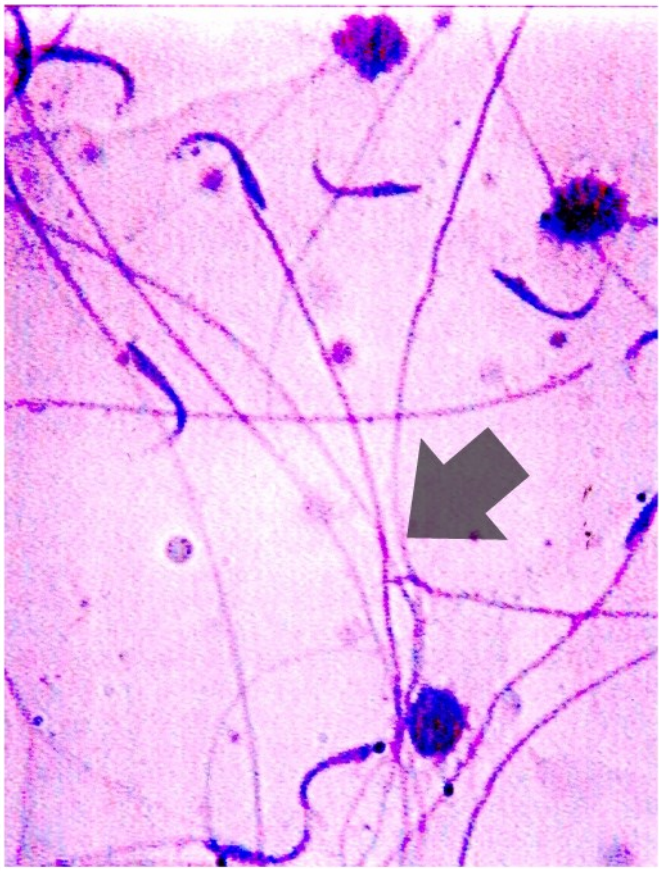


Gânglio Espinhal - Impregnação argêntica - Ap. de Golgi -400X

Citoesqueleto: Especializações de Superfície Livre

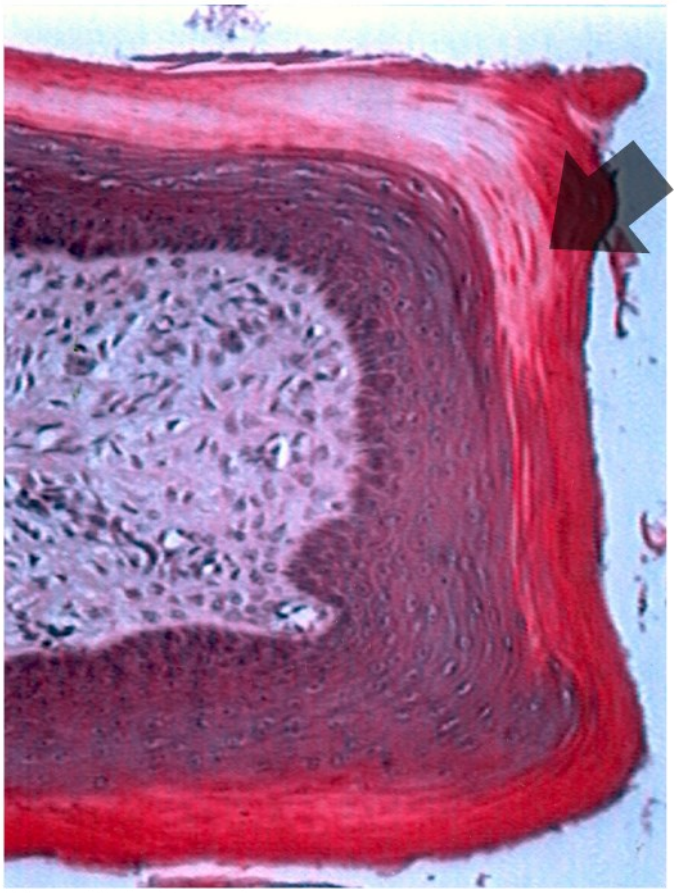


Traquéia (HE) - Cílios



Espermatozóides de Rato - Montagem Total (HE)

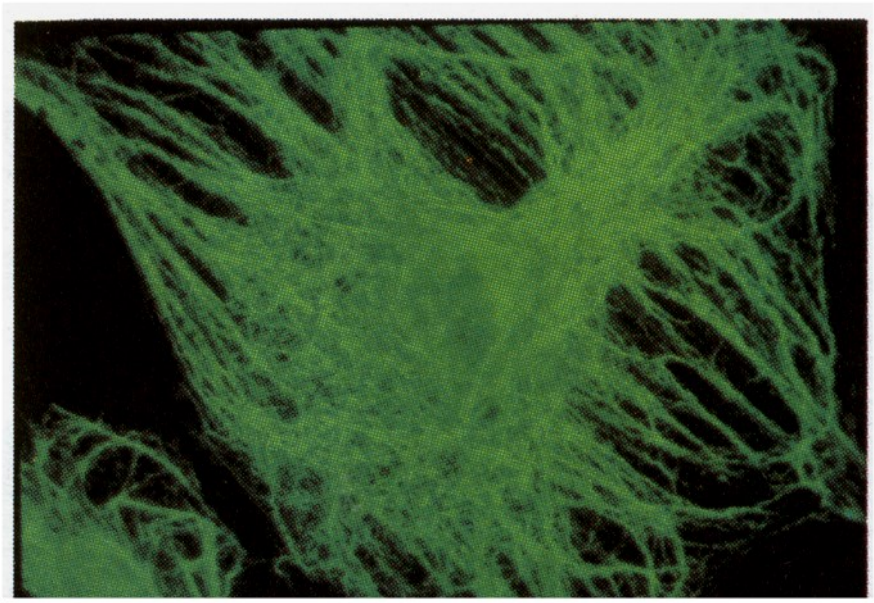
Epidídimo (HE) - Estereocílios



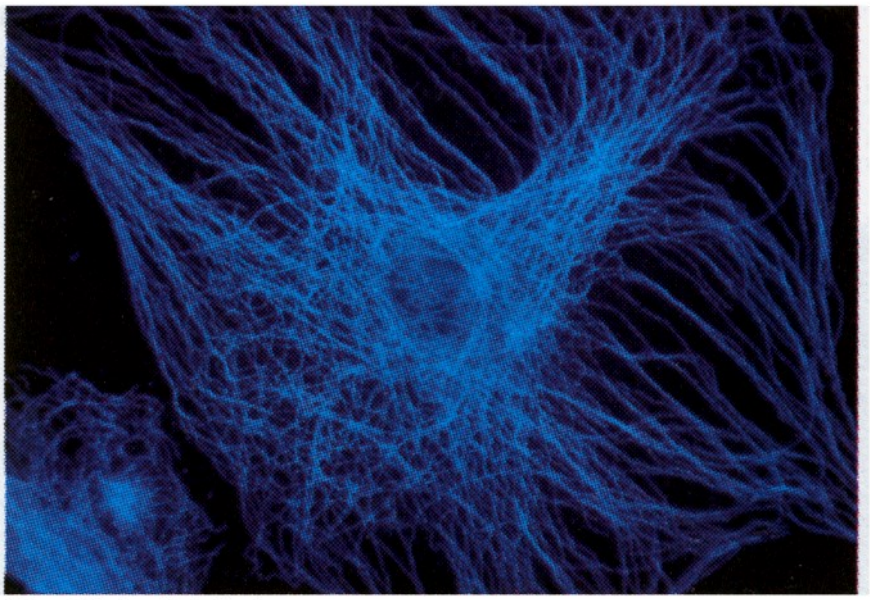
Lingua (HE) - Queratina

Citoesqueleto

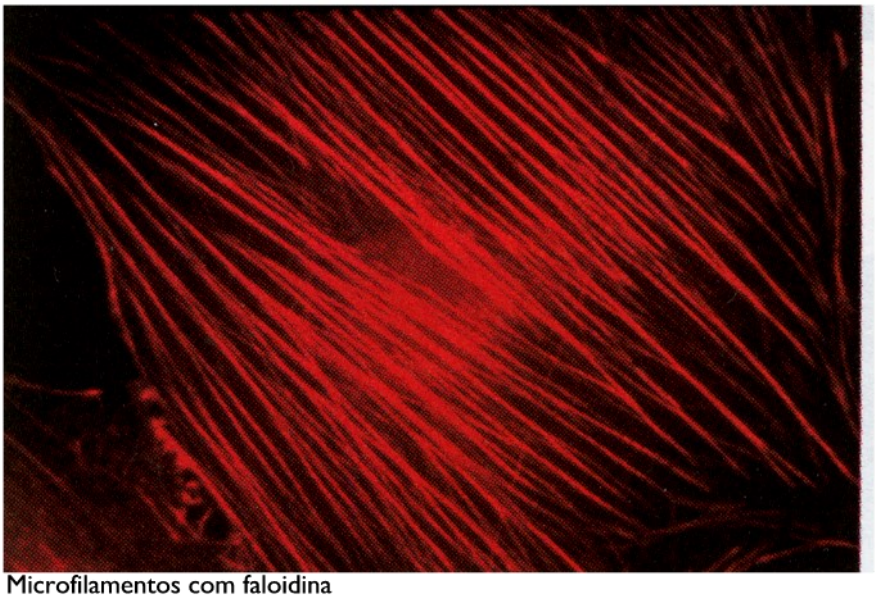
Imagens compiladas de Molecular cell biology \ Harvey Lodish P [et al.] - 4th ed. \ 2000



Filamentos intermediários (vimentina)



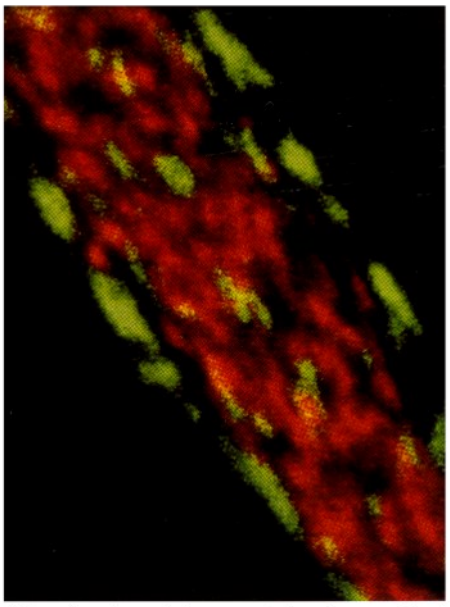
Microtúbulos (tubulina)



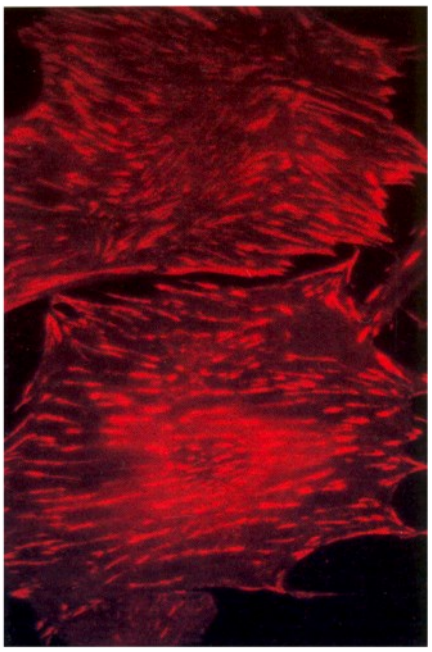
Microfilamentos com faloidina

Citoesqueleto

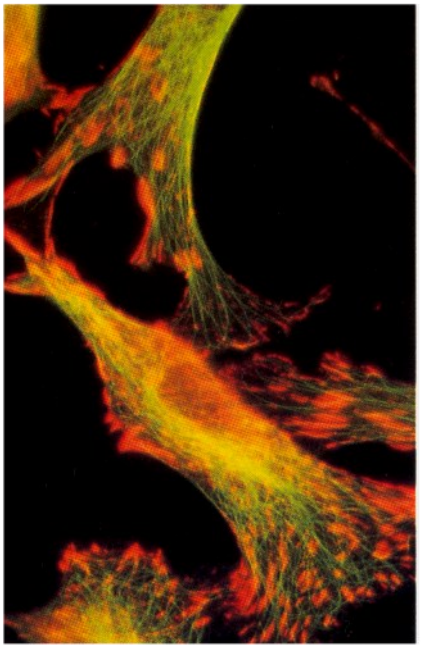
Imagens compiladas do Sigma Imunno Chemicals - 1995 & 1998 Catalog



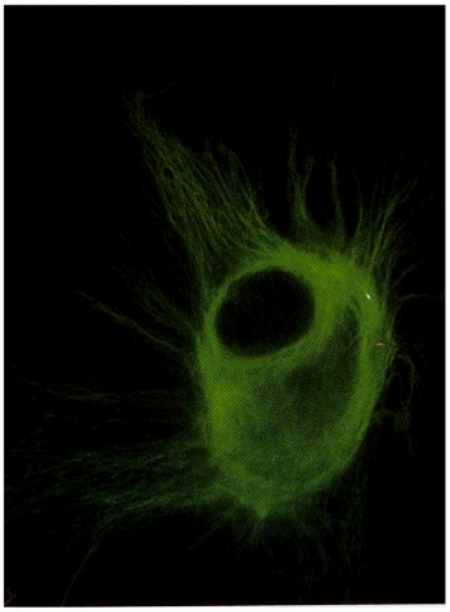
Vinculina (verde) eα actinina (vermelho)



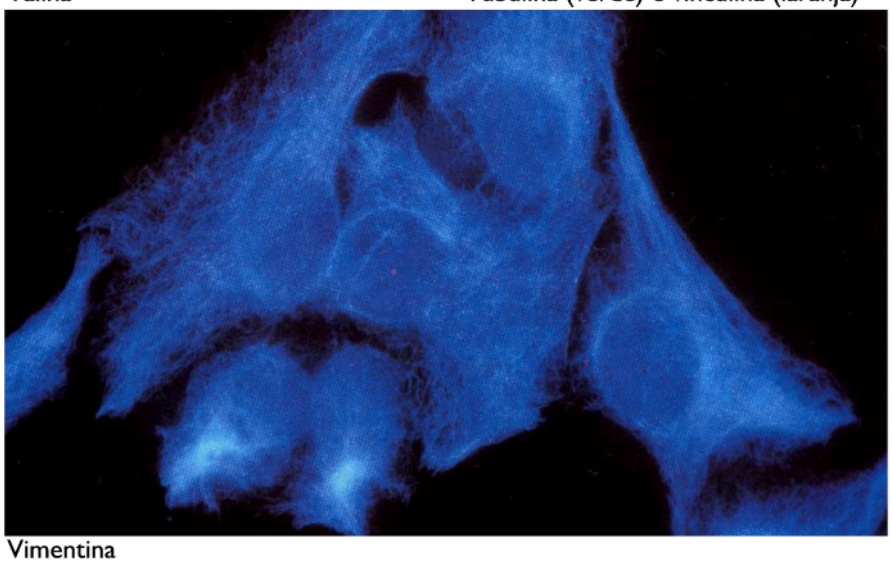
Talina



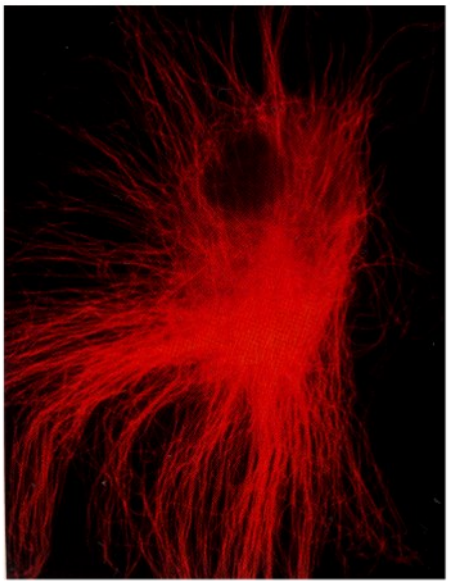
Tubulina (verde) e vinculina (laranja)



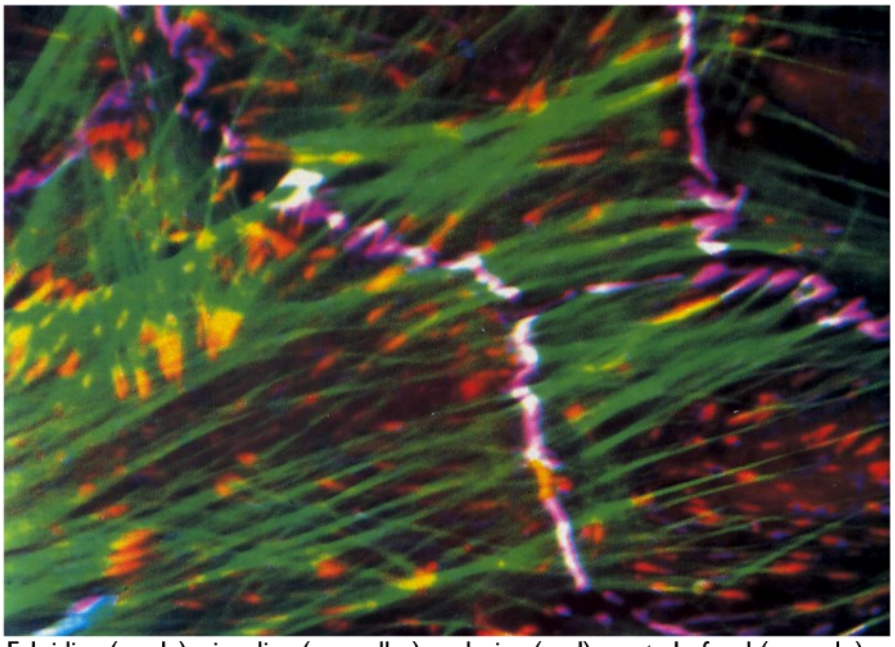
Vimentina



Vimentina

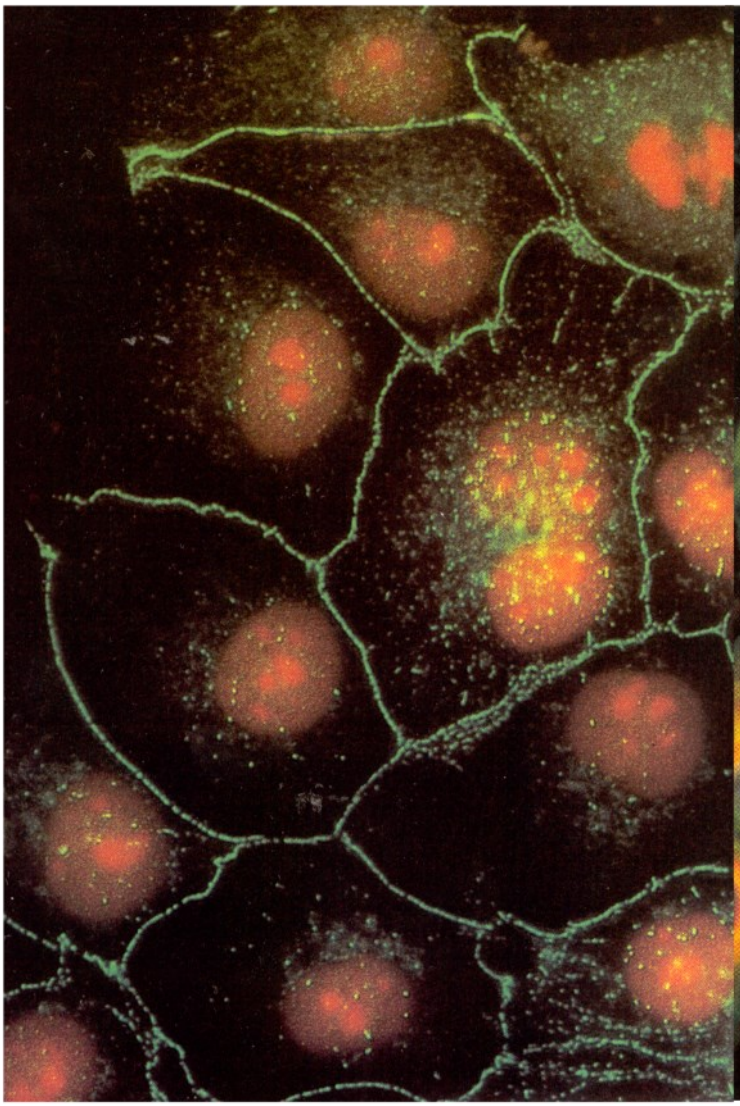


Tubulina

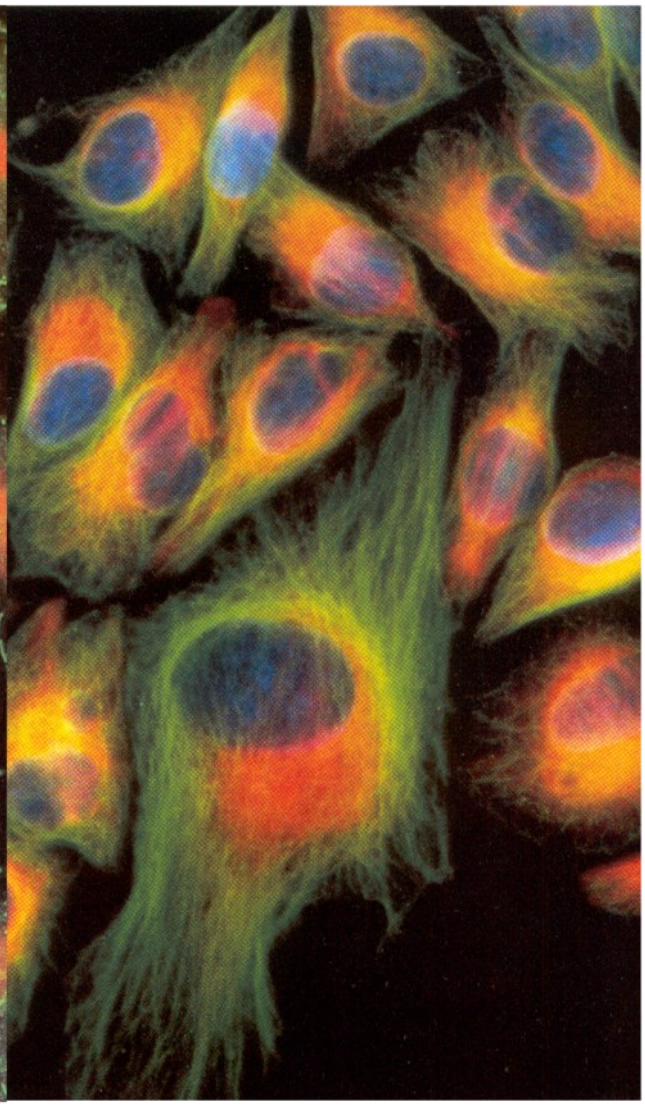


Faloidina (verde), vinculina (vermelho), caderina (azul), contado focal (amarelo).

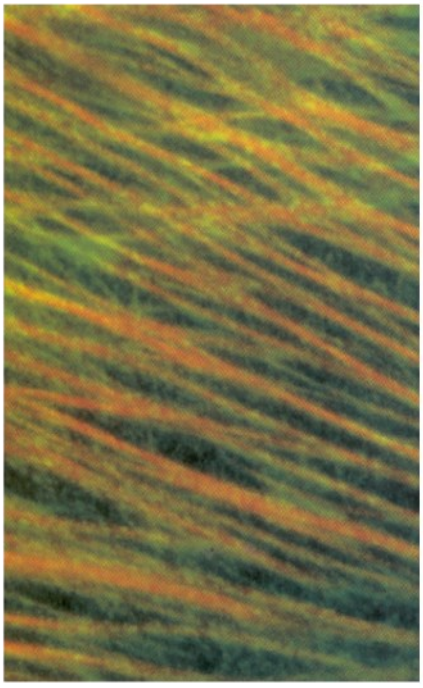
Citoesqueleto



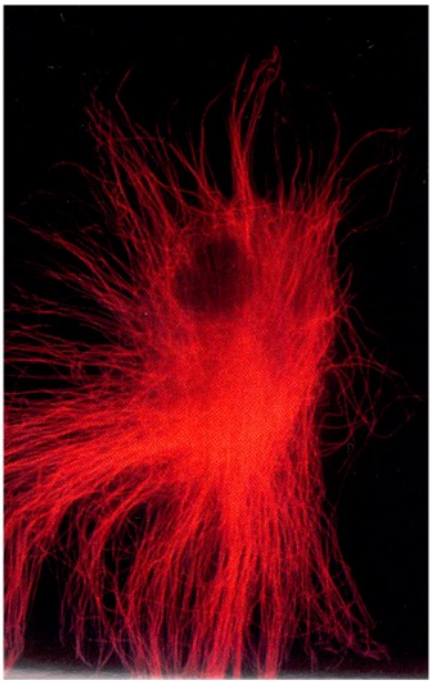
Proteinas desmossômicas



Citoqueratina (verde) e vimentina (vermelho)



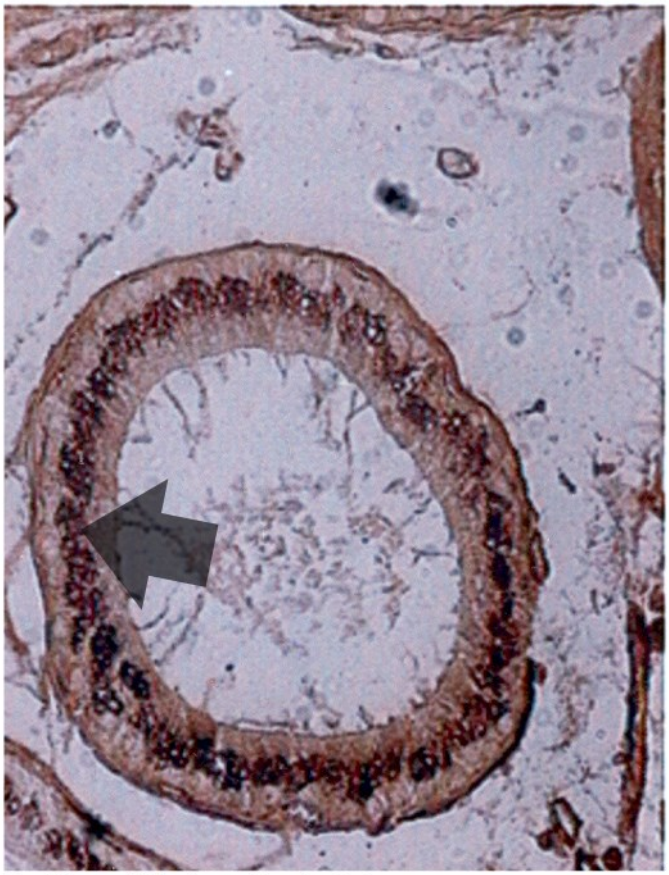
Células da aorta de camundongo: α actina (esquerda) e α actinina (centro)



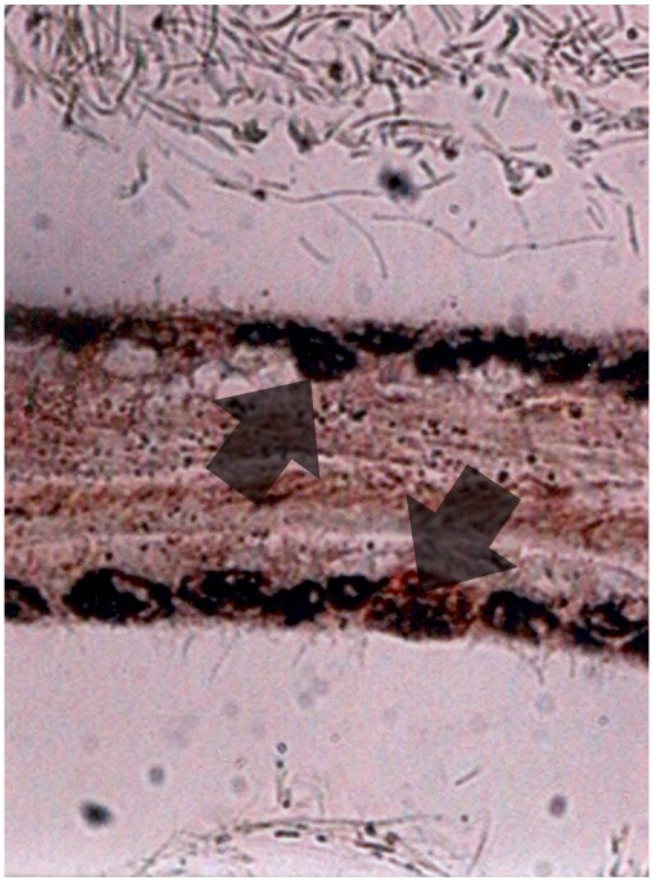
Fibroblato - Tubulinas

Secreção Celular

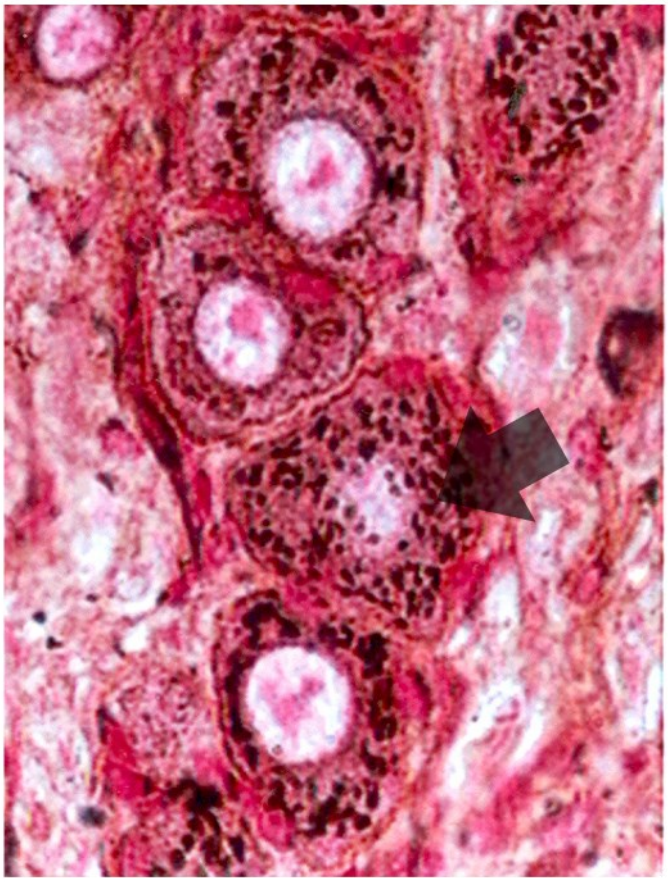
Pâncreas (HE) - Ergastoplasma (seta) G. zimogênio (*)



Epidídimo (IA) - Aparelho de Golgi

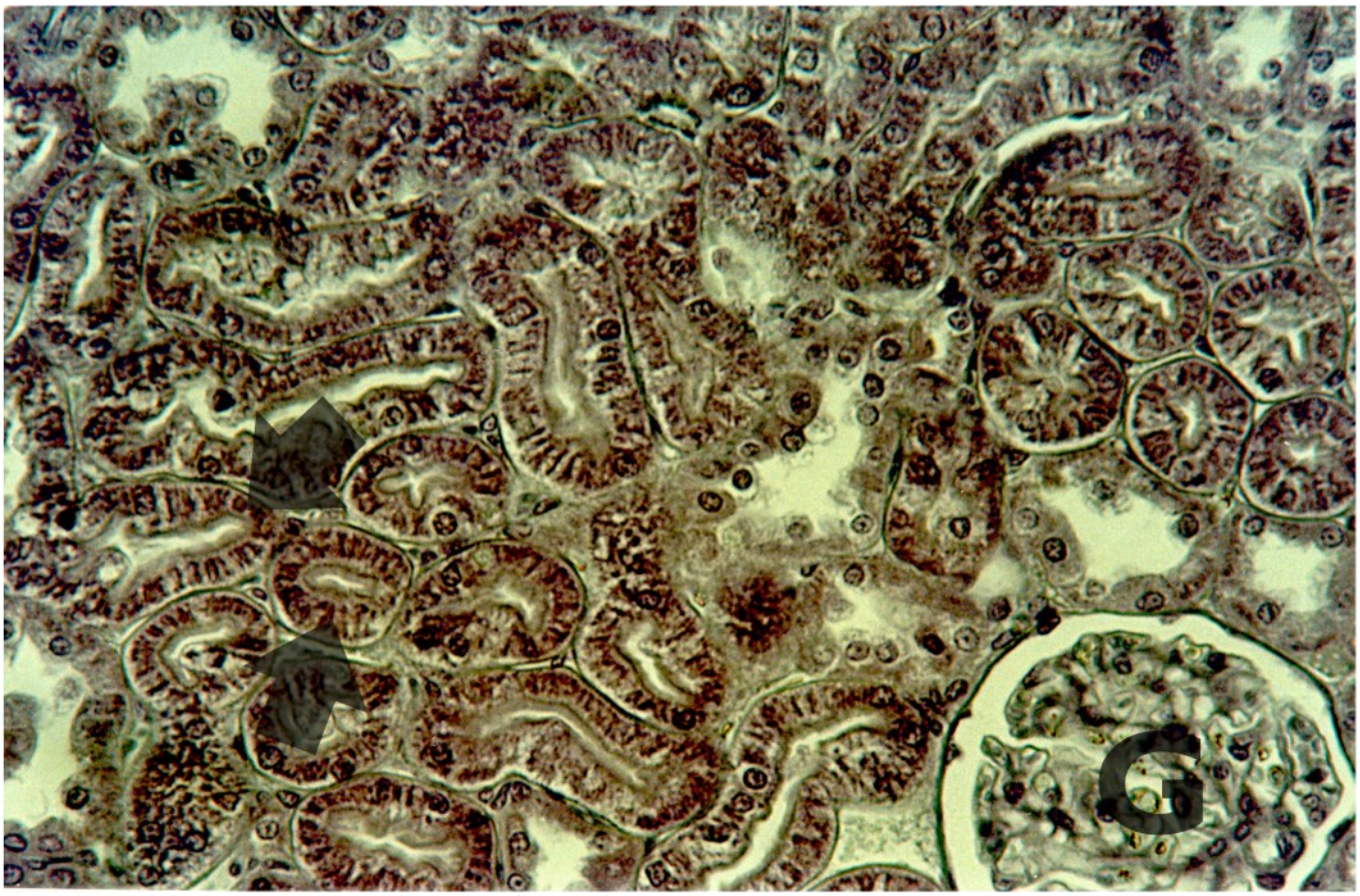


Epidídimo (IA) - Aparelho de Golgi

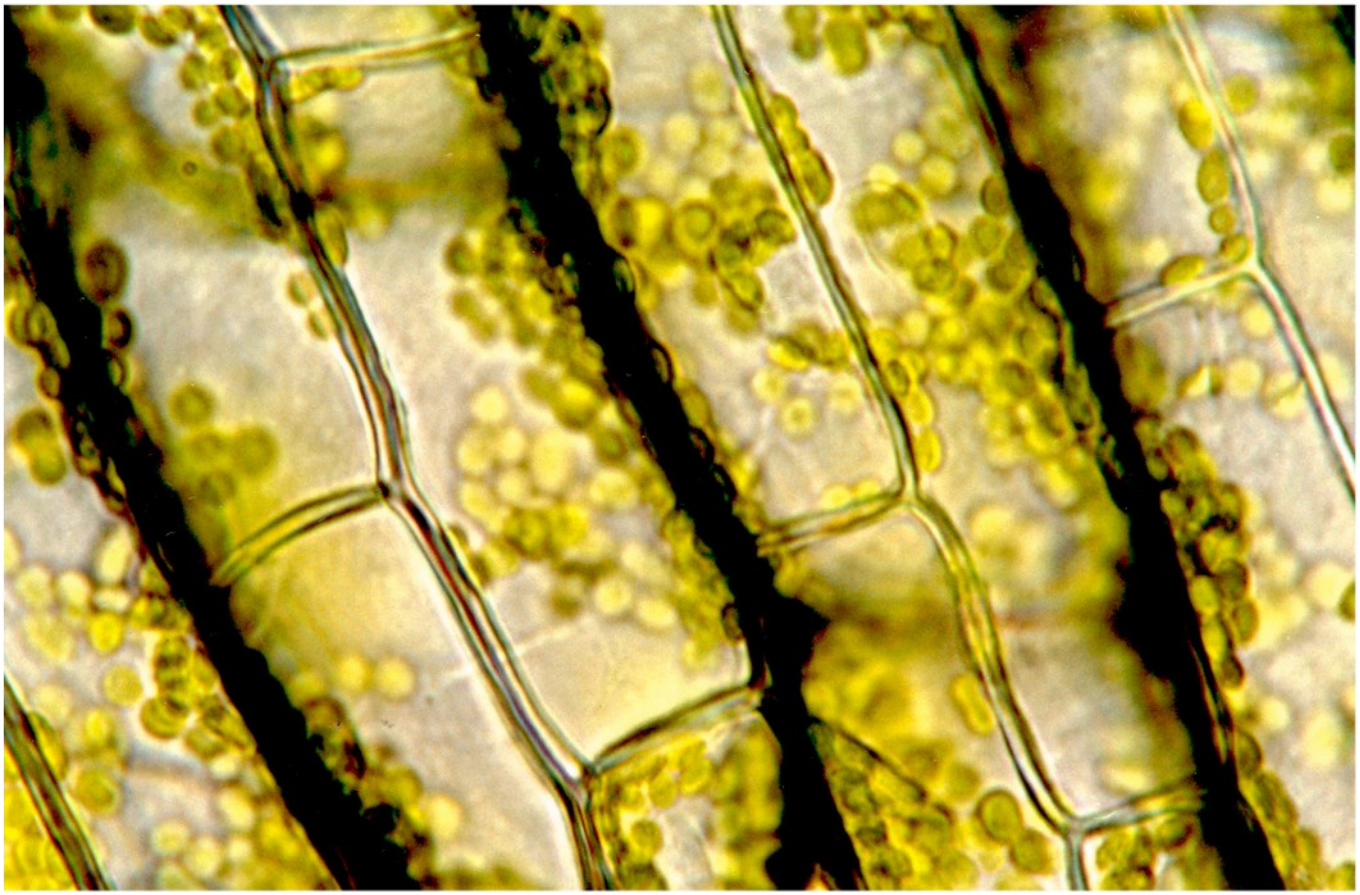


Gânglio Espinhal (IA/E) - Aparelho de Golgi

Produção de Energia - Metabolismo Celular

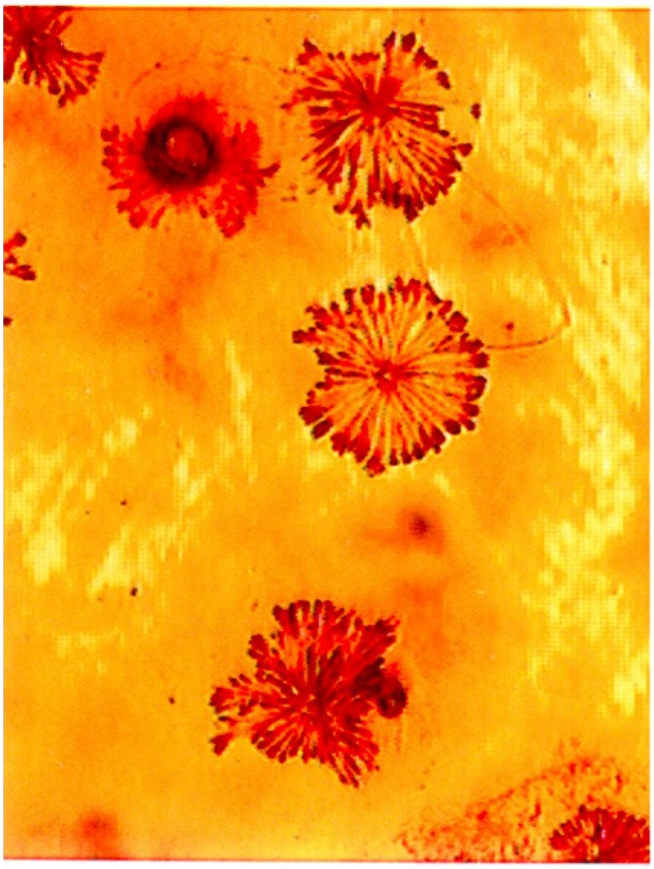


Rim de rato (H), Glomerulo renal (G) - Mitocôndrias (setas)



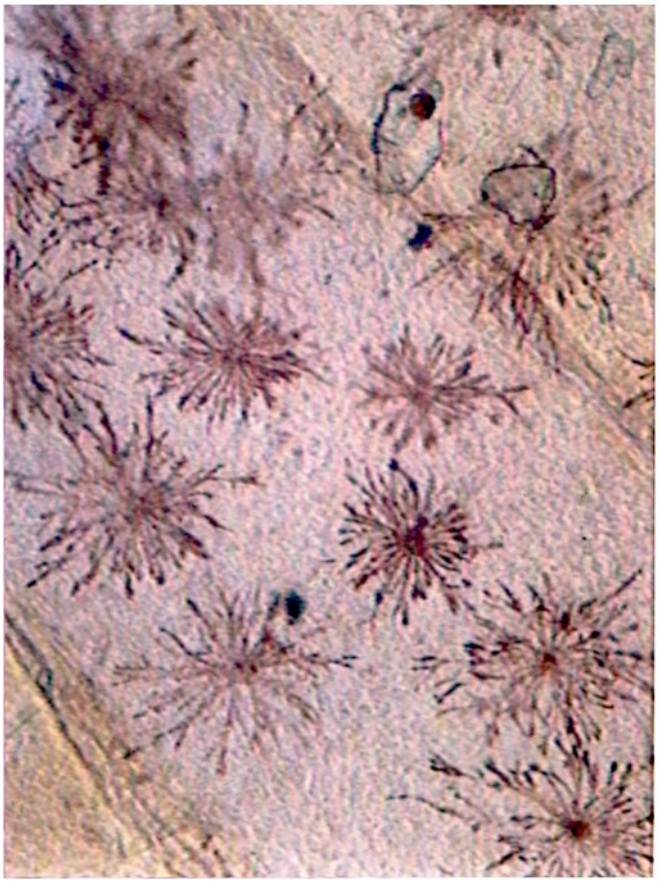
Elodea canadensis - (s/col.) - Cloroplastos.

Inclusões Pigmentares de Melanina

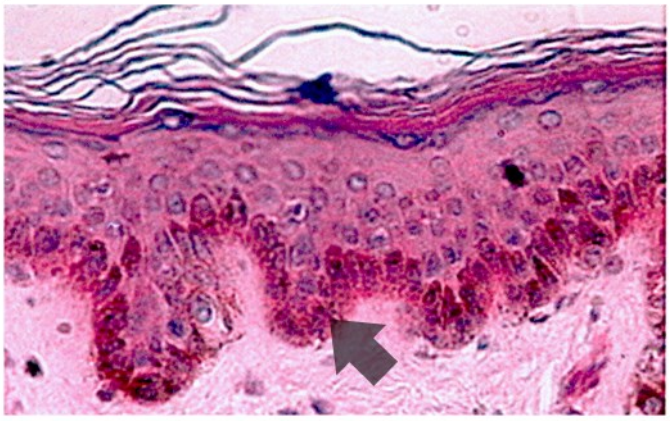


Escama de Peixe (Fixação - Bouin) - Melanóforo

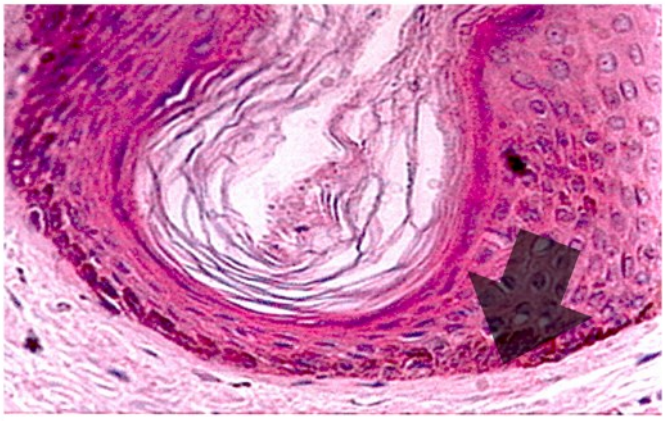
Melanóforo (ampliado)



Escama de Peixe (Sem fixação) - Melanóforo

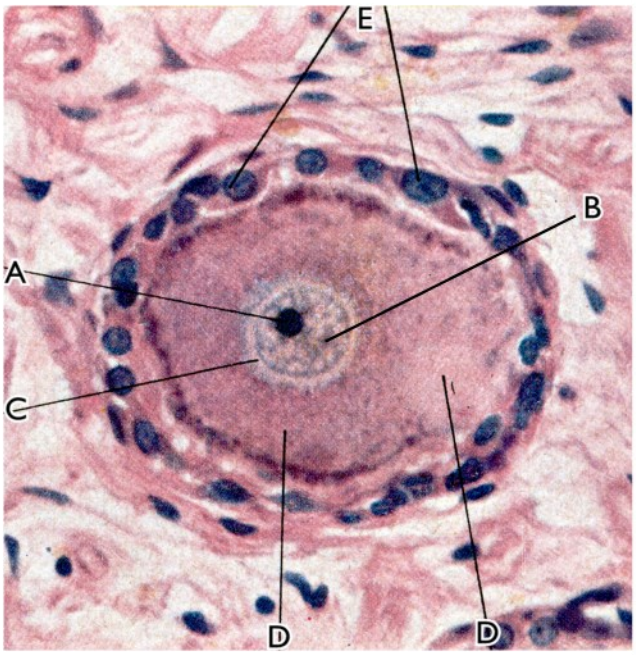


Pele Humana (HE) - Melanócito



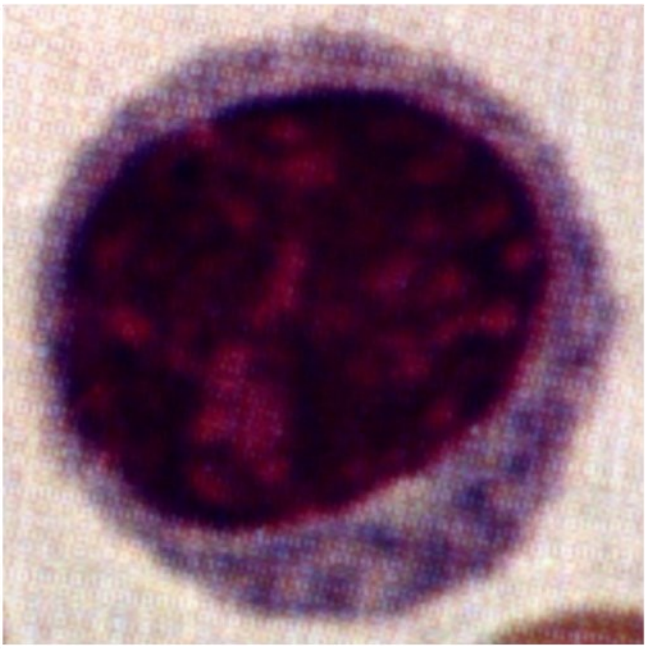
Pele Humana (HE) - Melanócito

Núcleo Interfásico - Constituintes e Morfologia do Núcleo



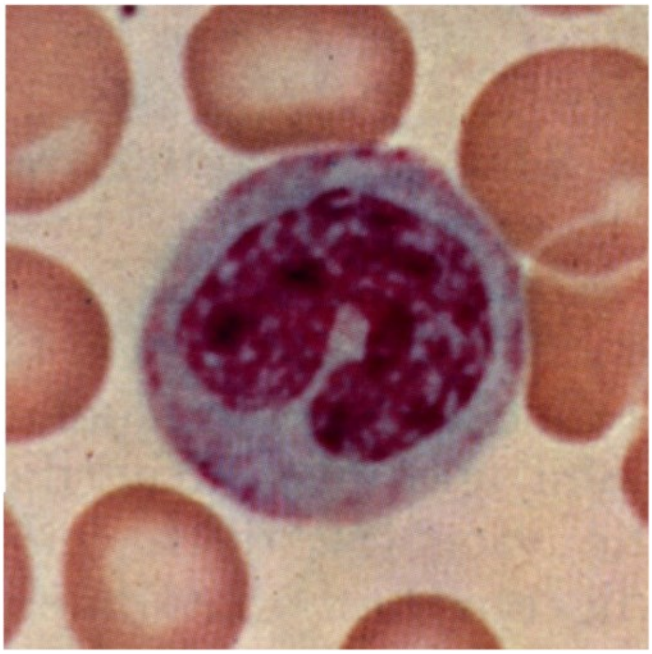
Gânglio espinhal de rato

A - Nucléolo
B - Heterocromatina
C - Limite (envoltório ?) Nuclear
D - Citoplasma
E - Núcleo das células satélites



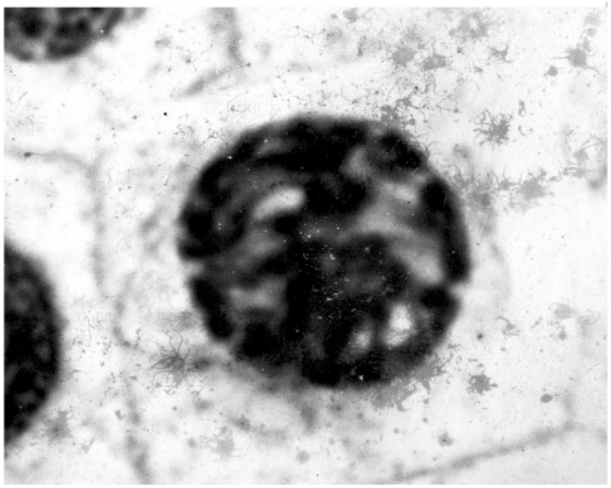
Leucócito Linfócito - Núcleo Circular

Leucócito Neutrófilo - Núcleo lobulado

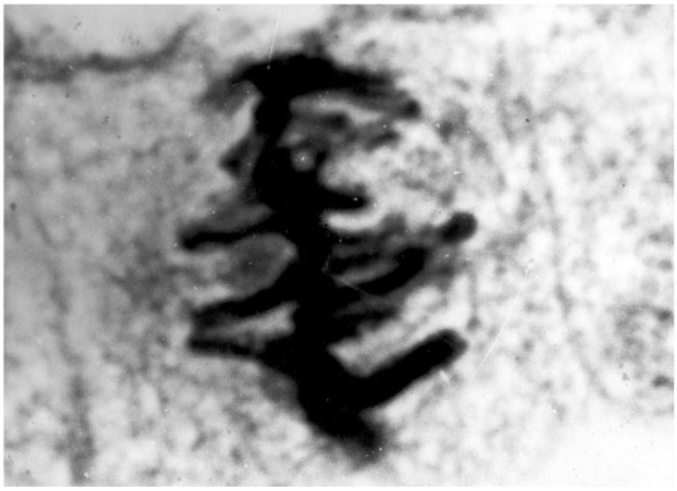


Leucócito Monócito - Núcleo reniforme

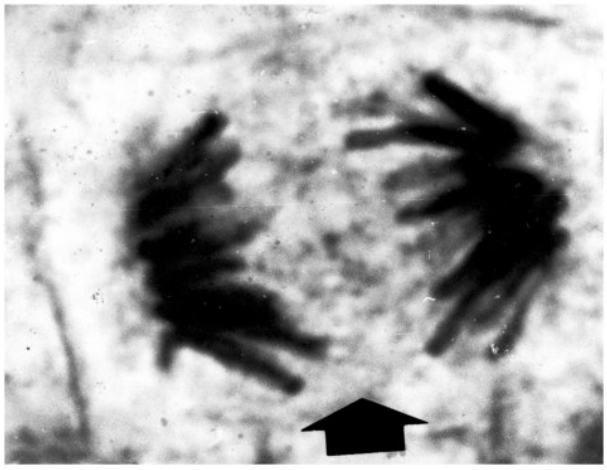
Divisão Celular: Mitose



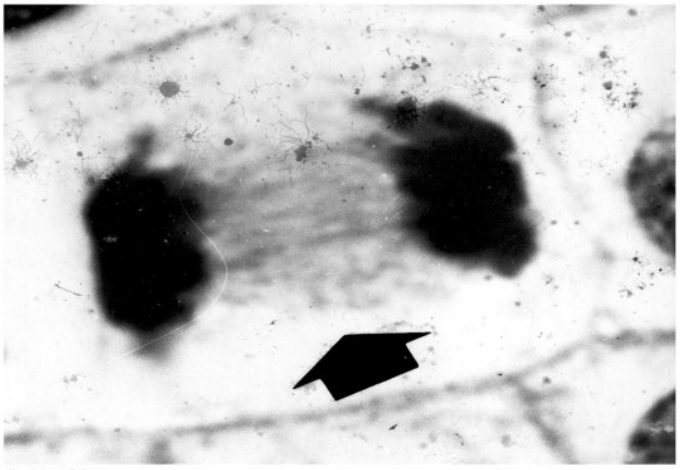
1. Prófase



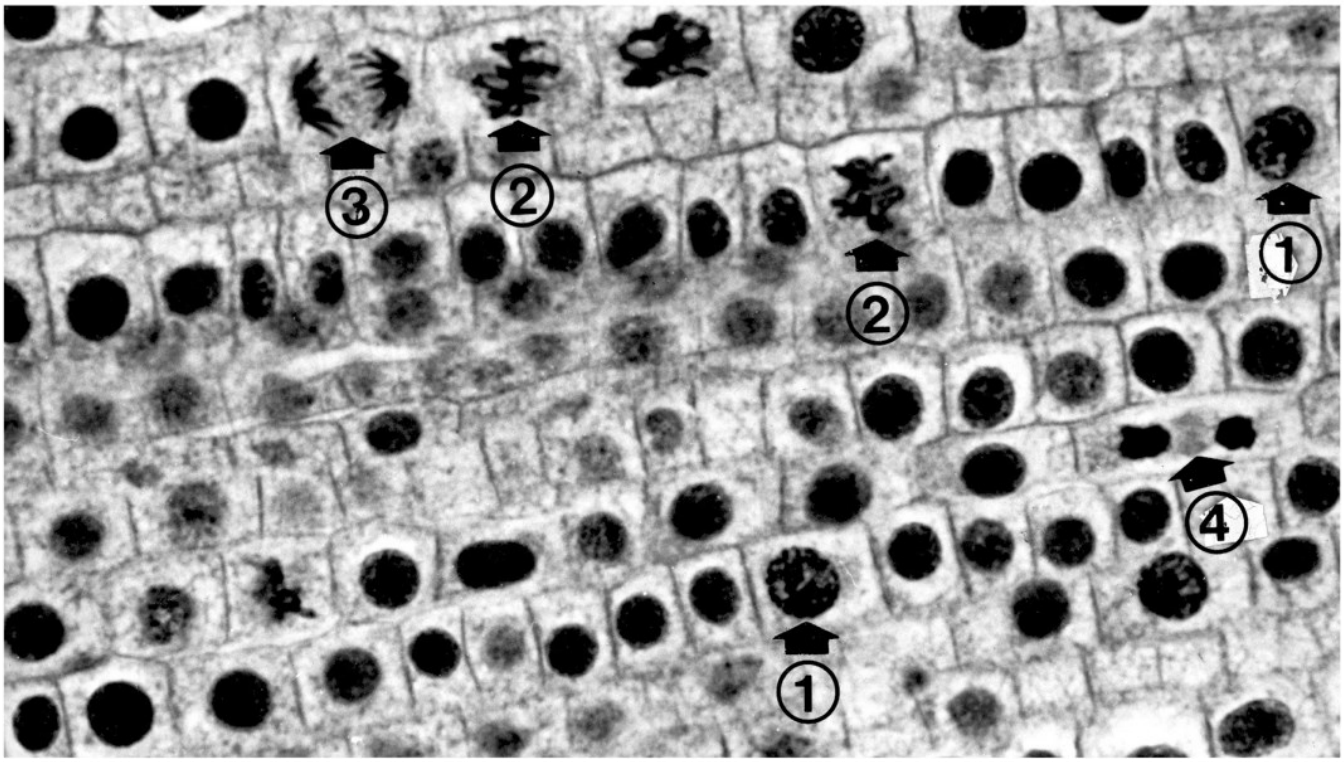
2. Metáfase



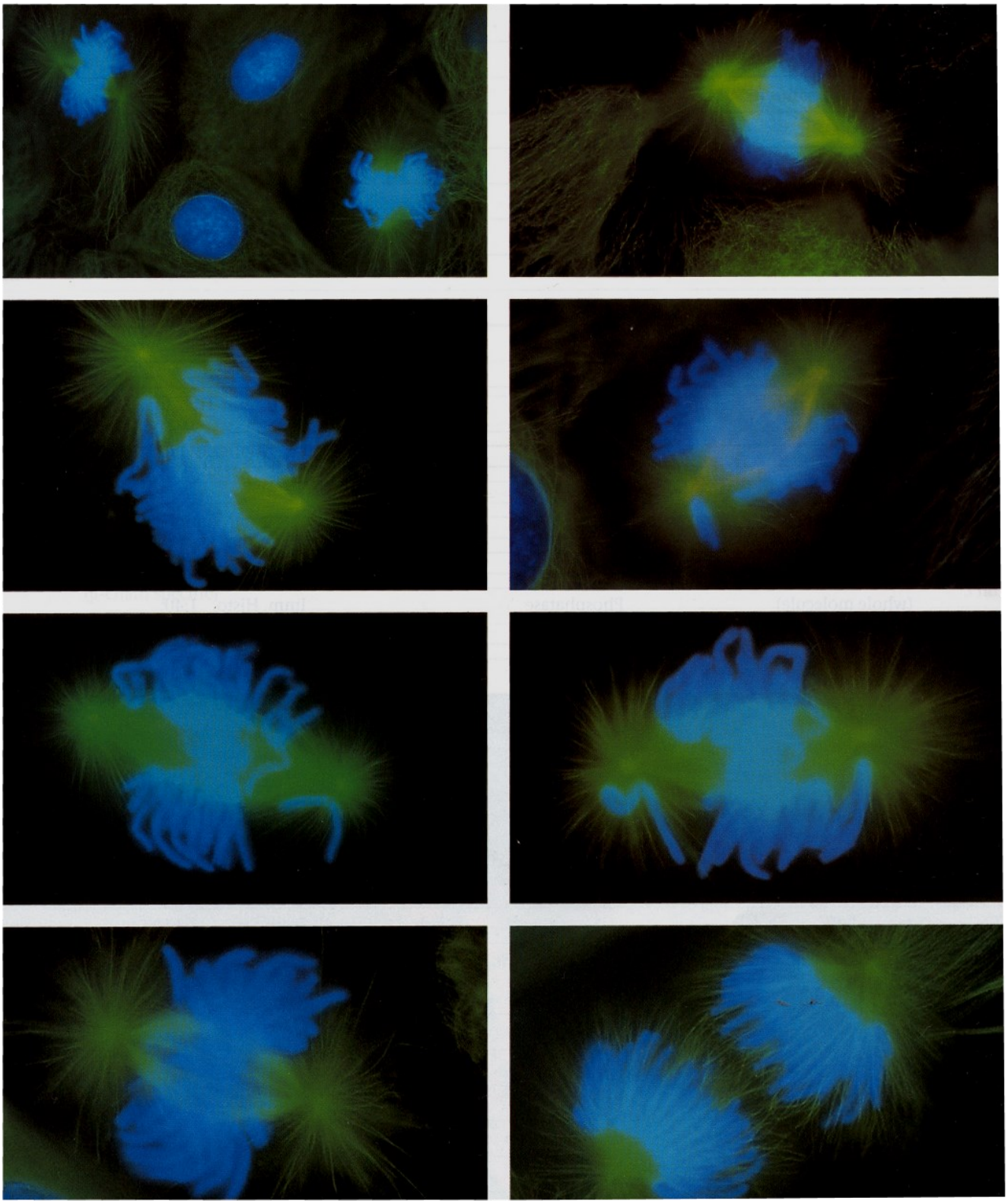
3. Anáfase



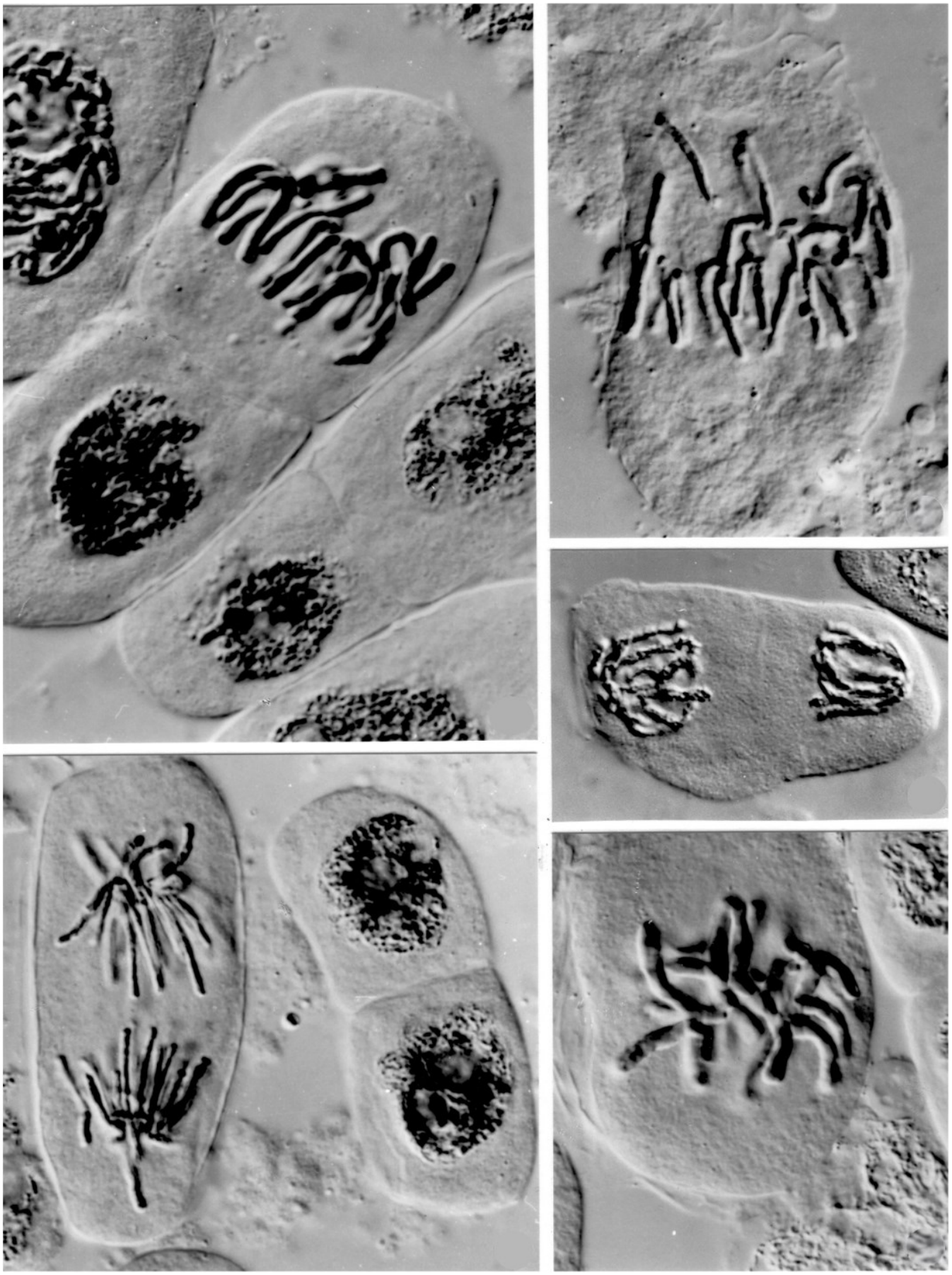
4. Telófase



Fases da divisão celular em raíz de cebola.



Células do pulmão de salamandra em divisão mitótica. Microtúbulos astrais - verdes. Fuso - amarelo. Cromossomos - azuis

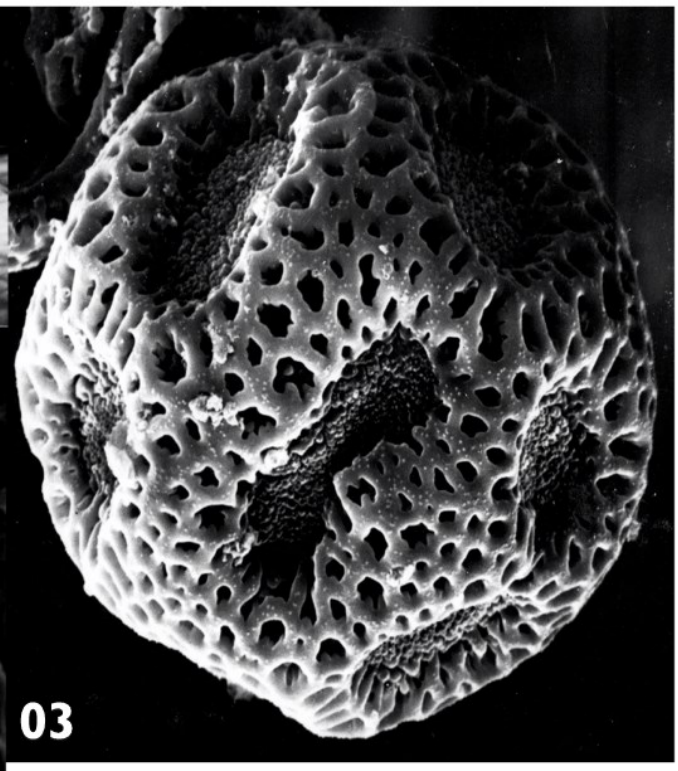


Fases da mitose do ápice radicular da faveira, *Vicia faba*,observadas ao microscópio de contraste de interferência de Normarski - 1500X

Aplicações da Microscopia Eletrônica de Varredura
Imagens de Espécimens Vegetais

CEREUS jamacaru DC - 300X

CEREUS jamacaru DC - 51X



01 - CESALPINIA FERREA Mart. - 90X

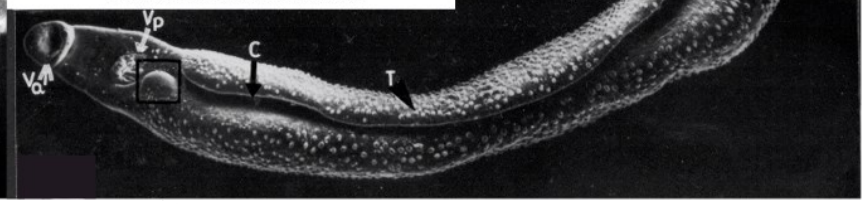
02 - CESALPINIA FERREA Mart. - Pelo Glandular - 400X

03 - Grão de Pólem - 300X

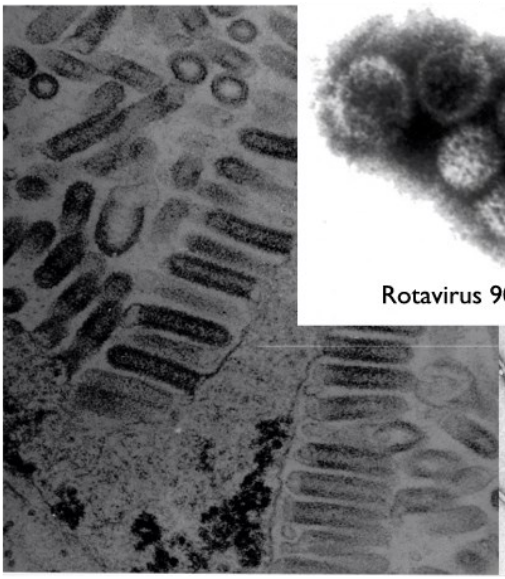
Aplicações da Microscopia Eletrônica de Varredura

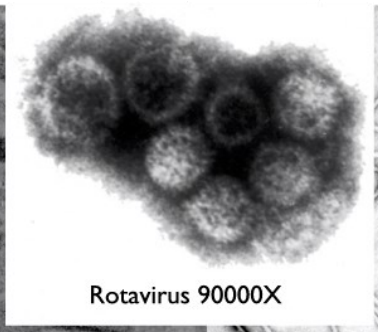
Ventosa Posterior 930X

Ventosa Anterior 930X



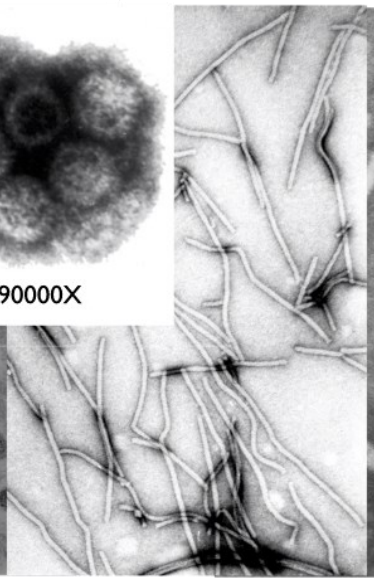
Schistosoma mansoni - 75X



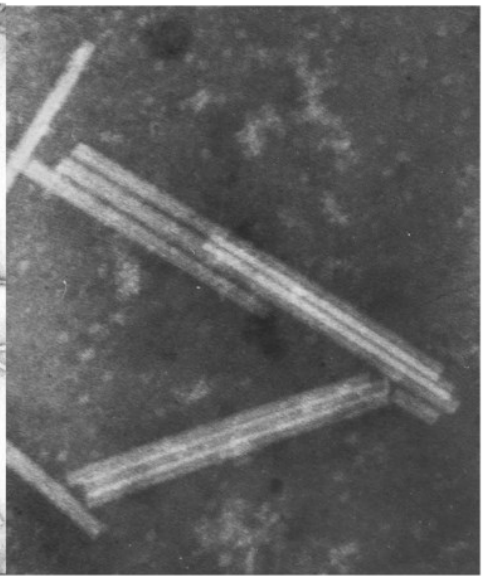


Rotavirus 90000X

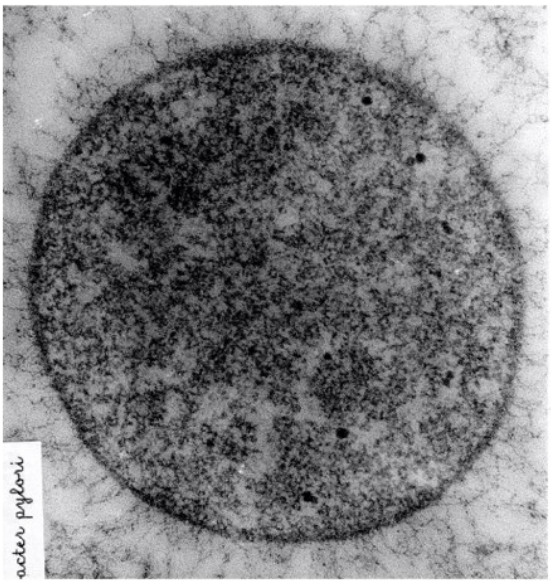
Rabdovirus - 80000X



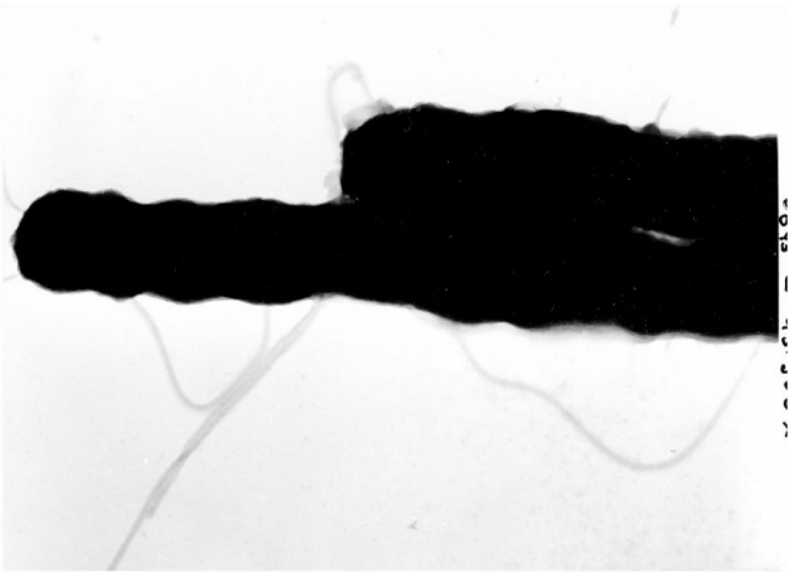
Virus do Mosaico do Caupi



Virus do Tabaco



Licobacter pylori - 98000X

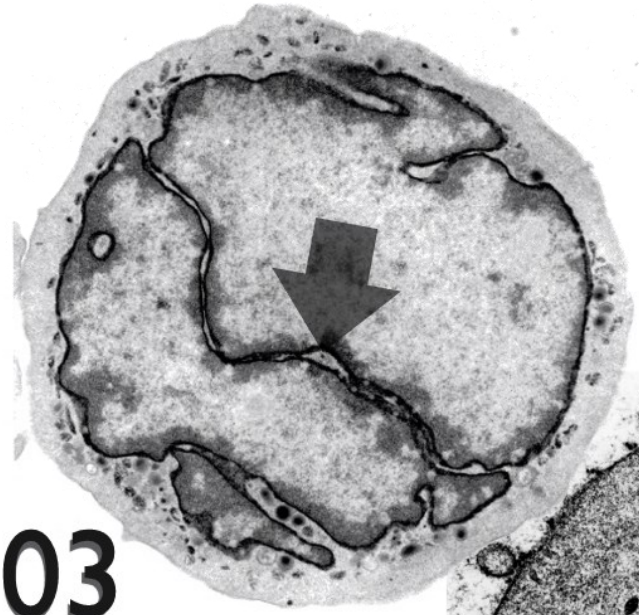


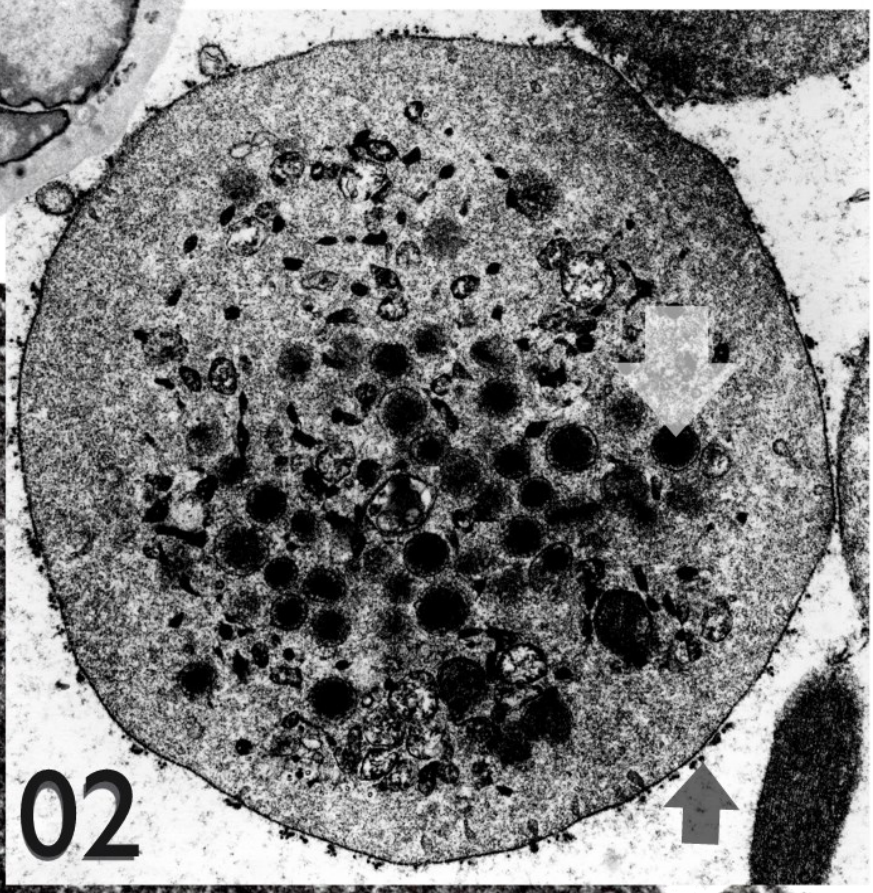
Licobacter pylori 50000X

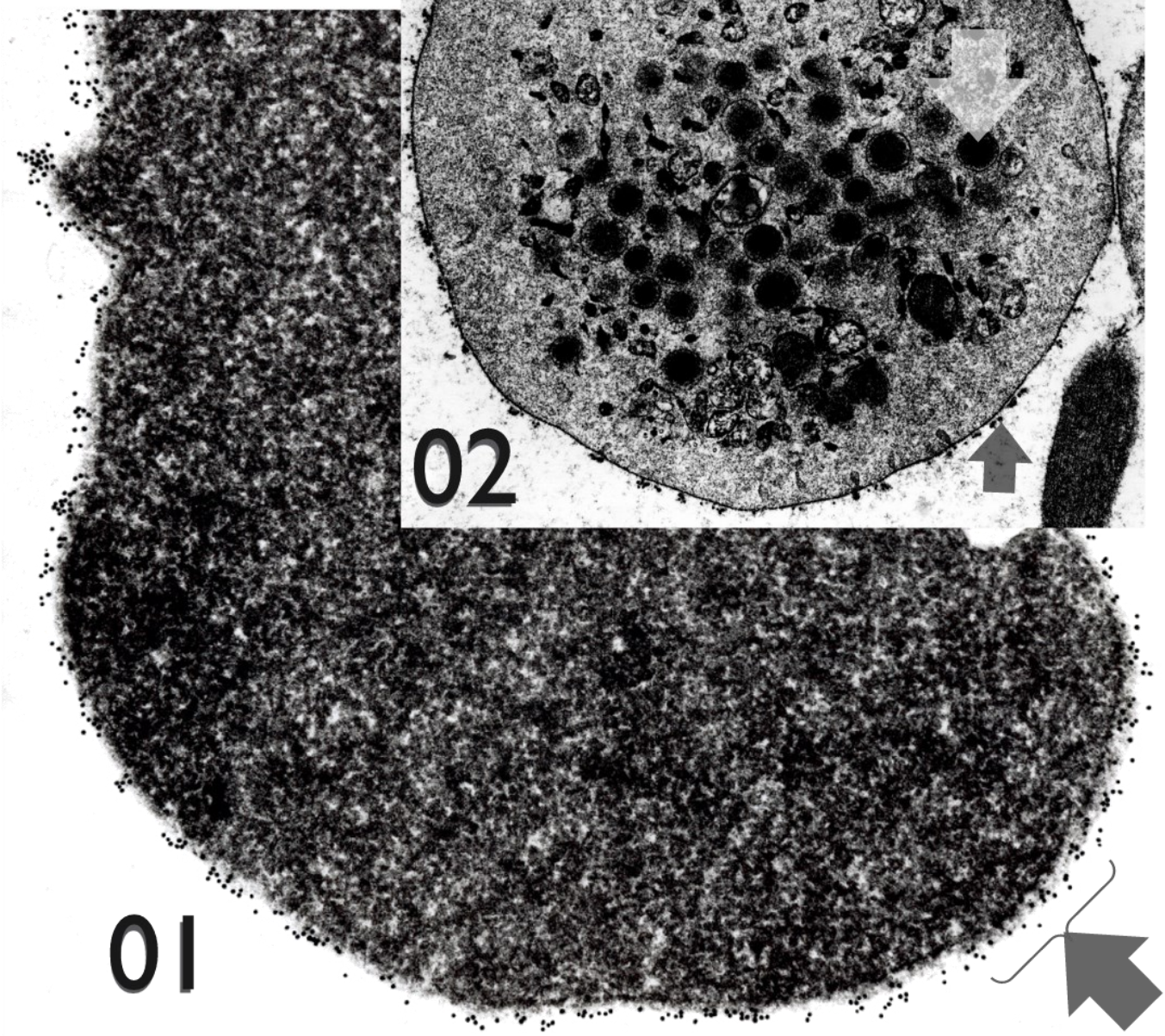
01 - Eritroblasto - E6.PO - 30000X

02 - Plaqueta - Peroxidase P3.PO 30000X

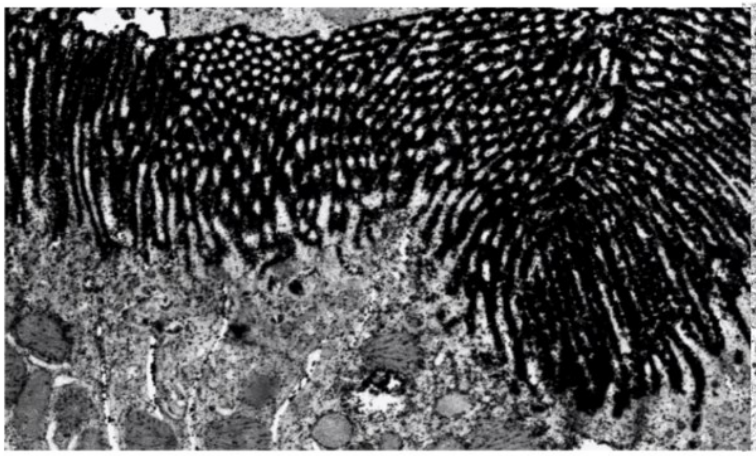
03 - Leucócito - Peroxidase -19800X



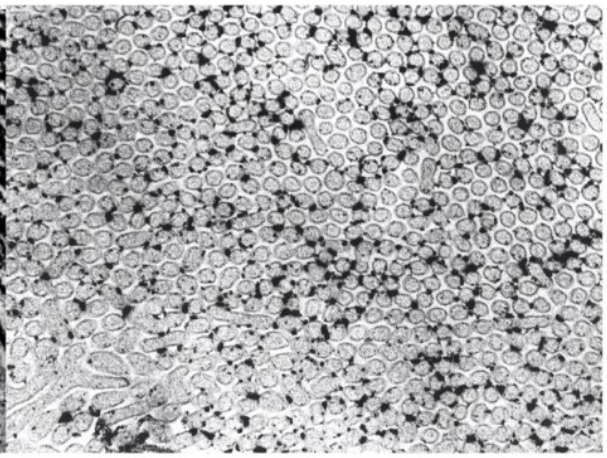




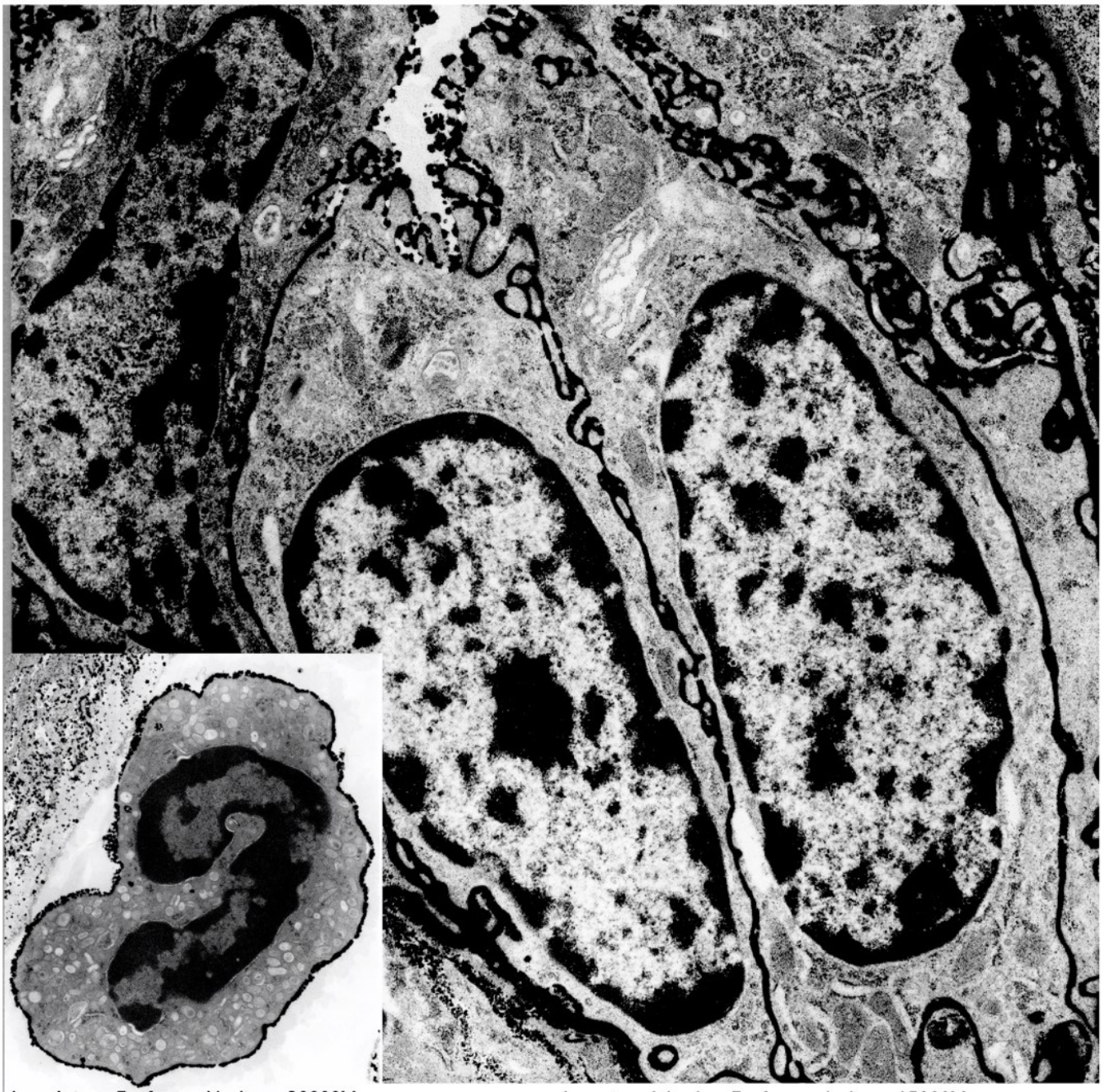
Citoquímica Ultra-estrutural



Microvilosidades - vários planos de cortes - 15000X



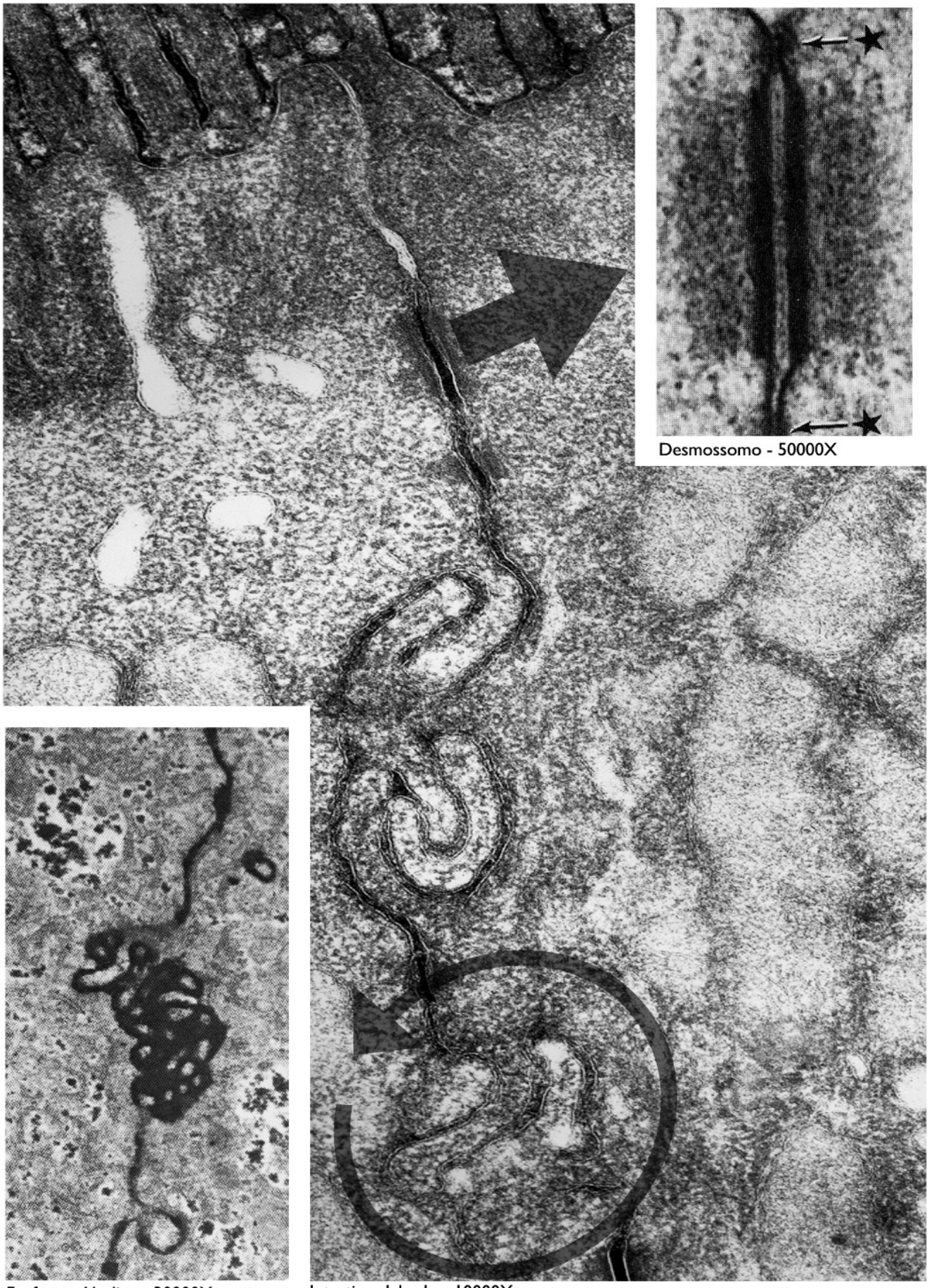
Microvilosidades - Cortes transversais - 60000X



Leucócito - Fosfatase Alcalina - 30000X

Intestino delgado - Fosfatase alcalina - 15000X

Membrana Plasmática: Junções

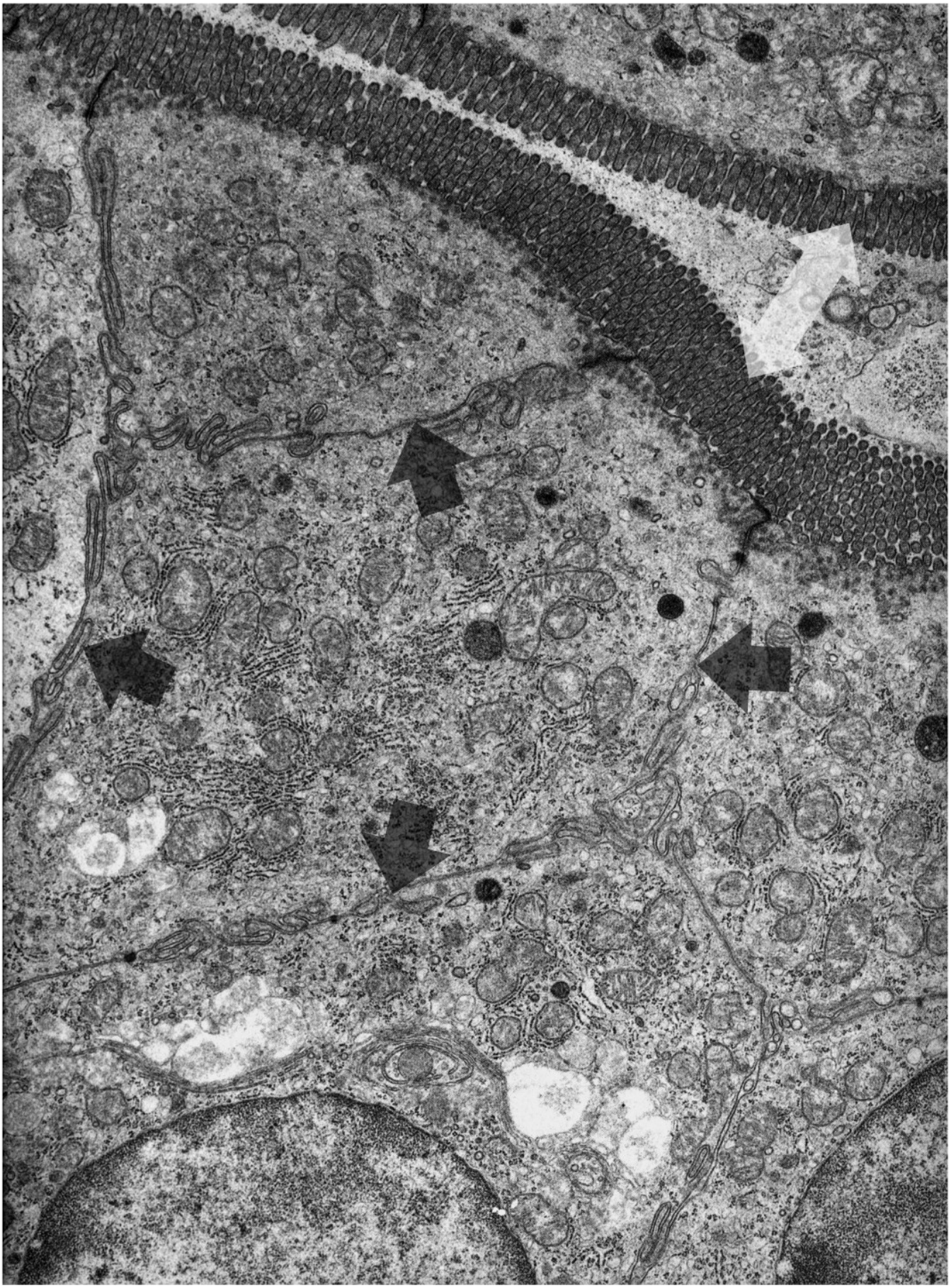


Desmossomo - 50000X

Fosfatase Alcalina - 30000X

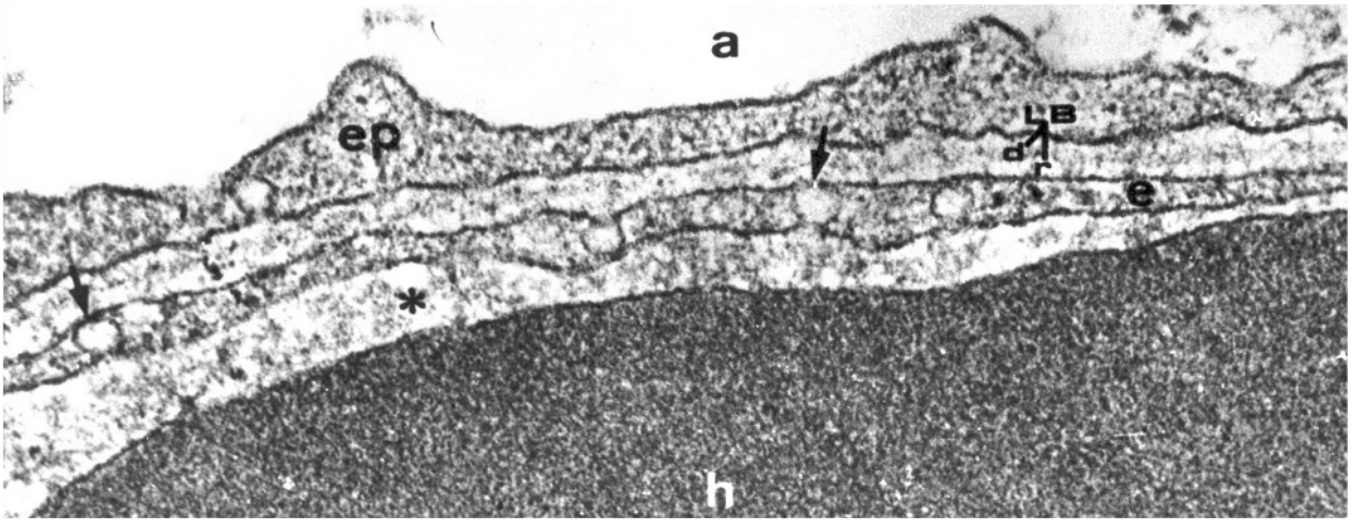
Intestino delgado - 10000X

Especializações: Laterais e de Superfície livre

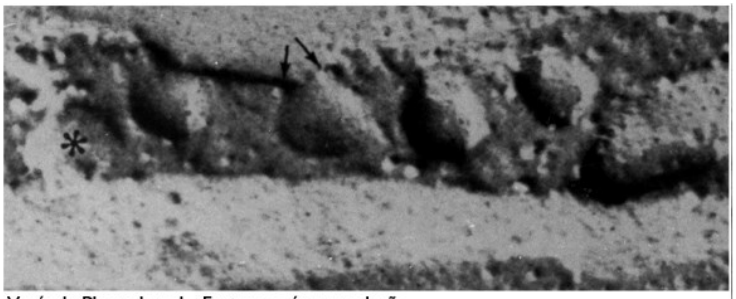


Intestino Delgado - 15000X

Pinocitose e Fagocitose

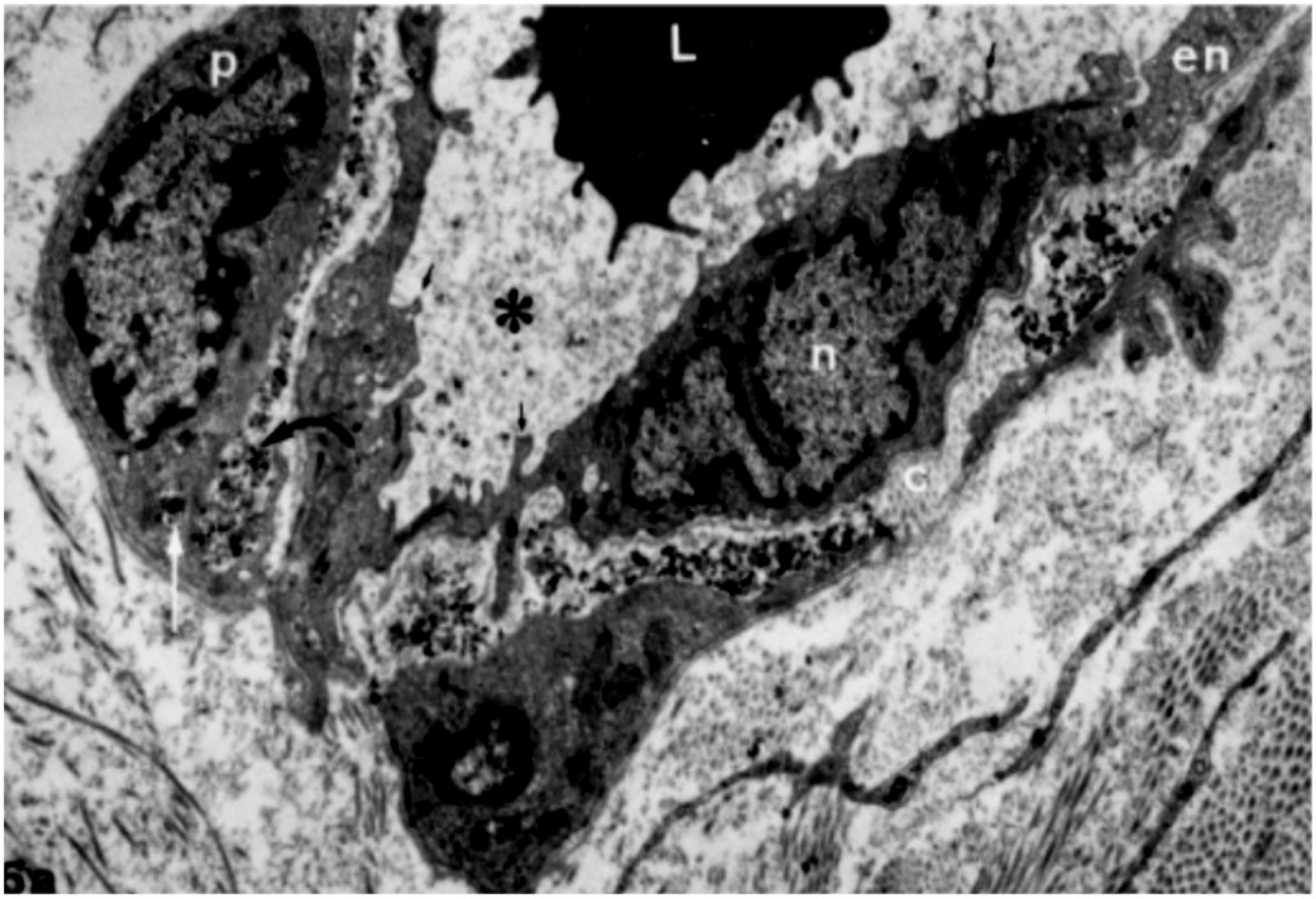


Capilar Pulmonar - Vesícula Plasmalemal e Canal Transendotelial (setas) - 40000X

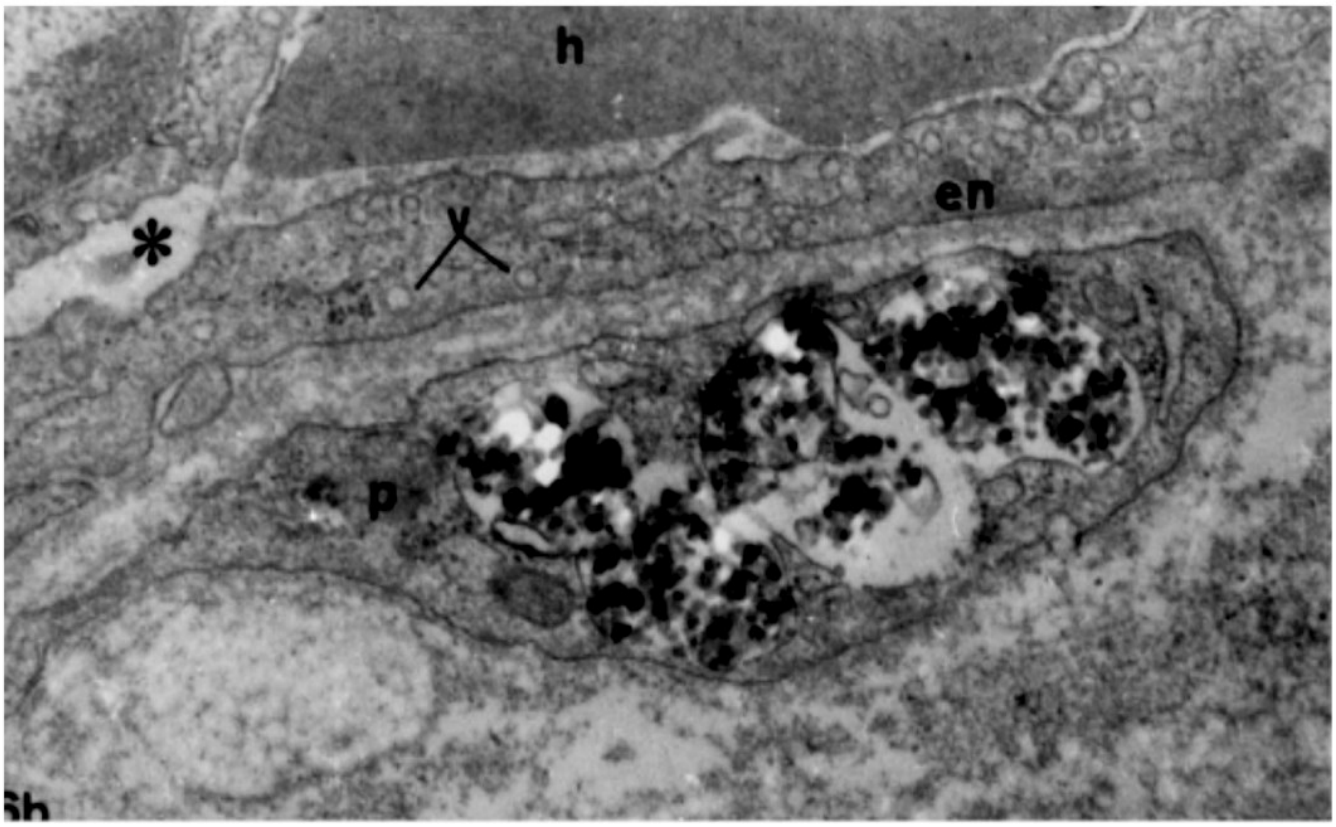


Vesícula Plasmalemal - Fratura após congelação

Capilar Peribrônquico - Junção Endotelial aberta mostrando a Passagem de Carvão Coloidal - 60000X

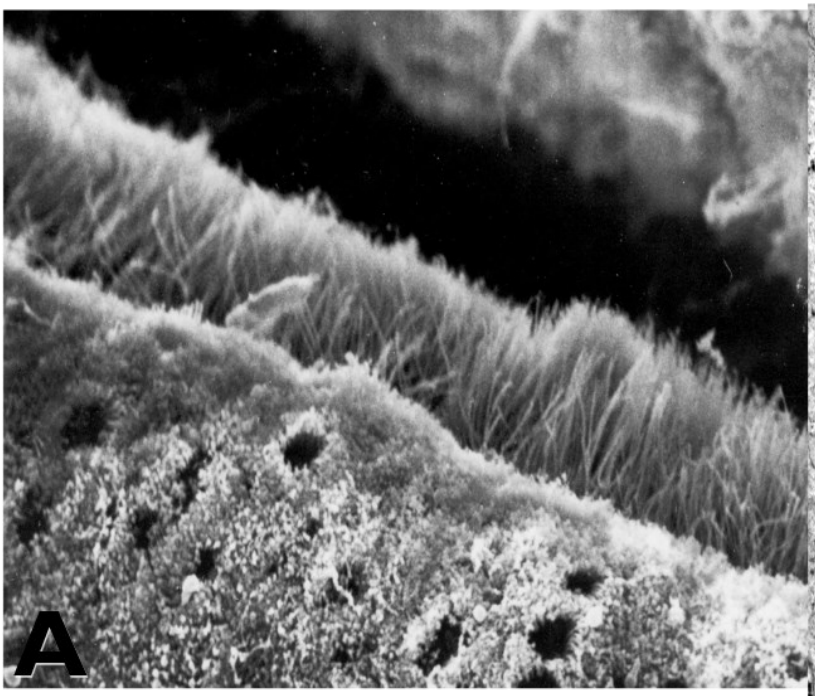


Capilar Peribrônquico exibindo saída do carvão coloidal, via junções endoteliais - 8000X

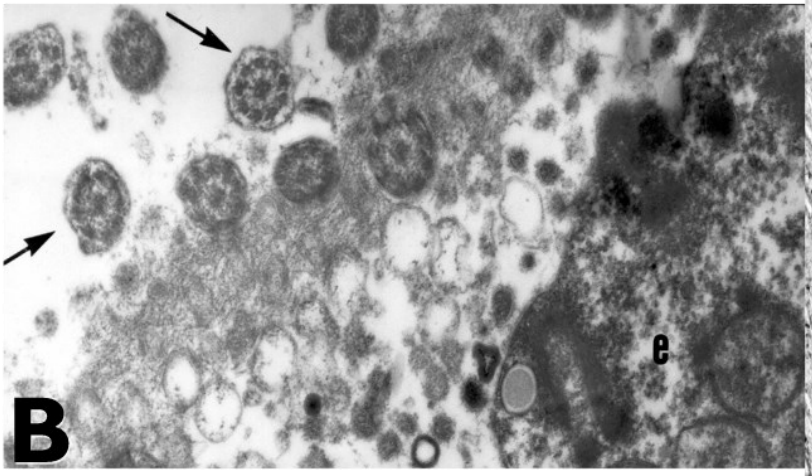


Pericito Fagocitando carvão coloidal - 50000X

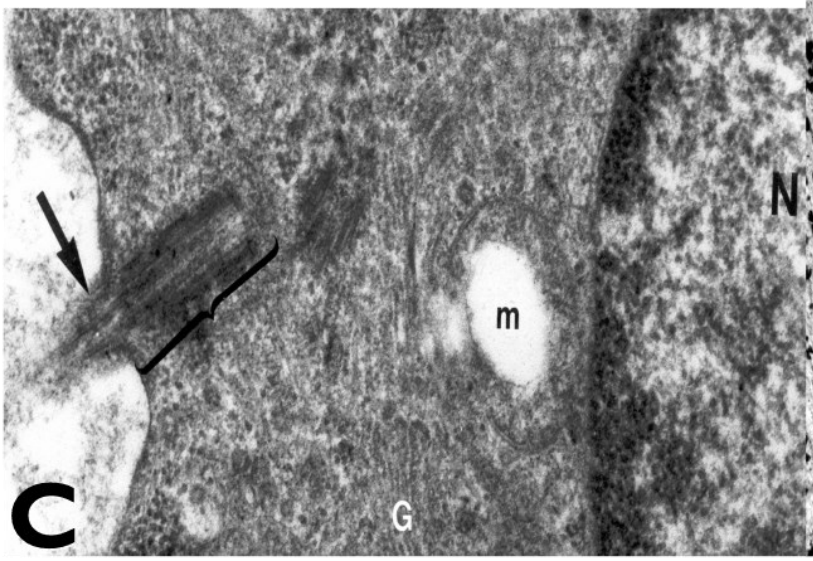
Citoesqueleto - Cílios



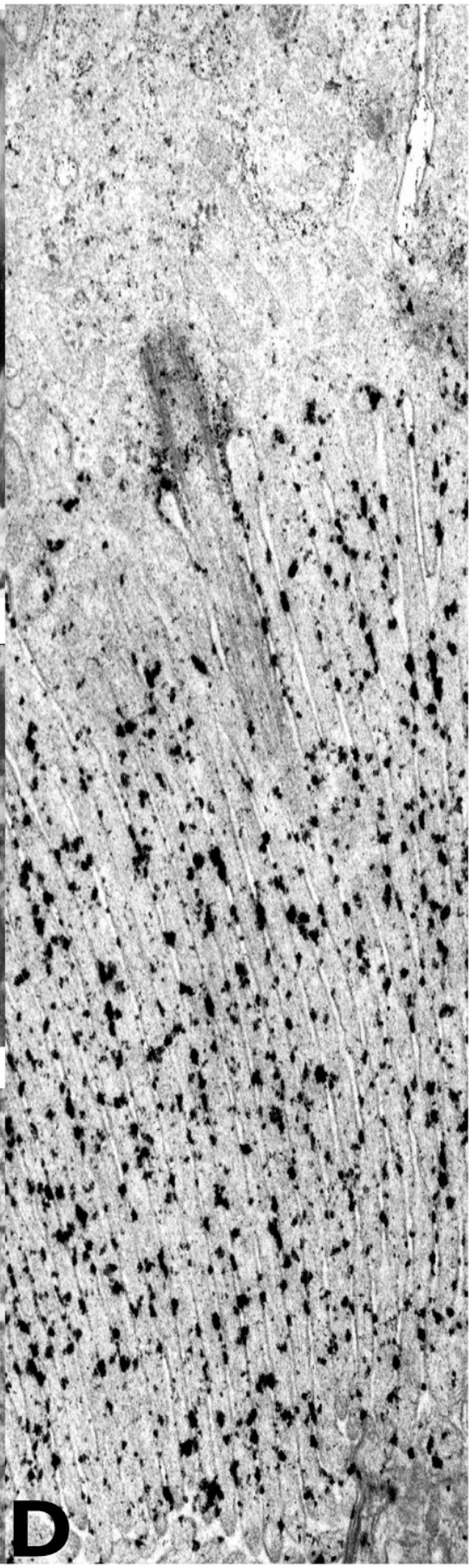
Sistema respiratório do Aruá (*Pomacea lineata*)- 1540X



Sistema respiratório do *Synbranchus marmoratus* - 50000X

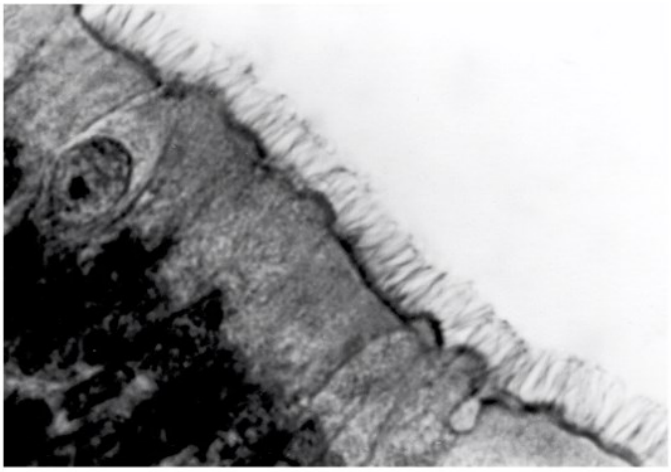


Fibroblasto - Cílios - 60000X

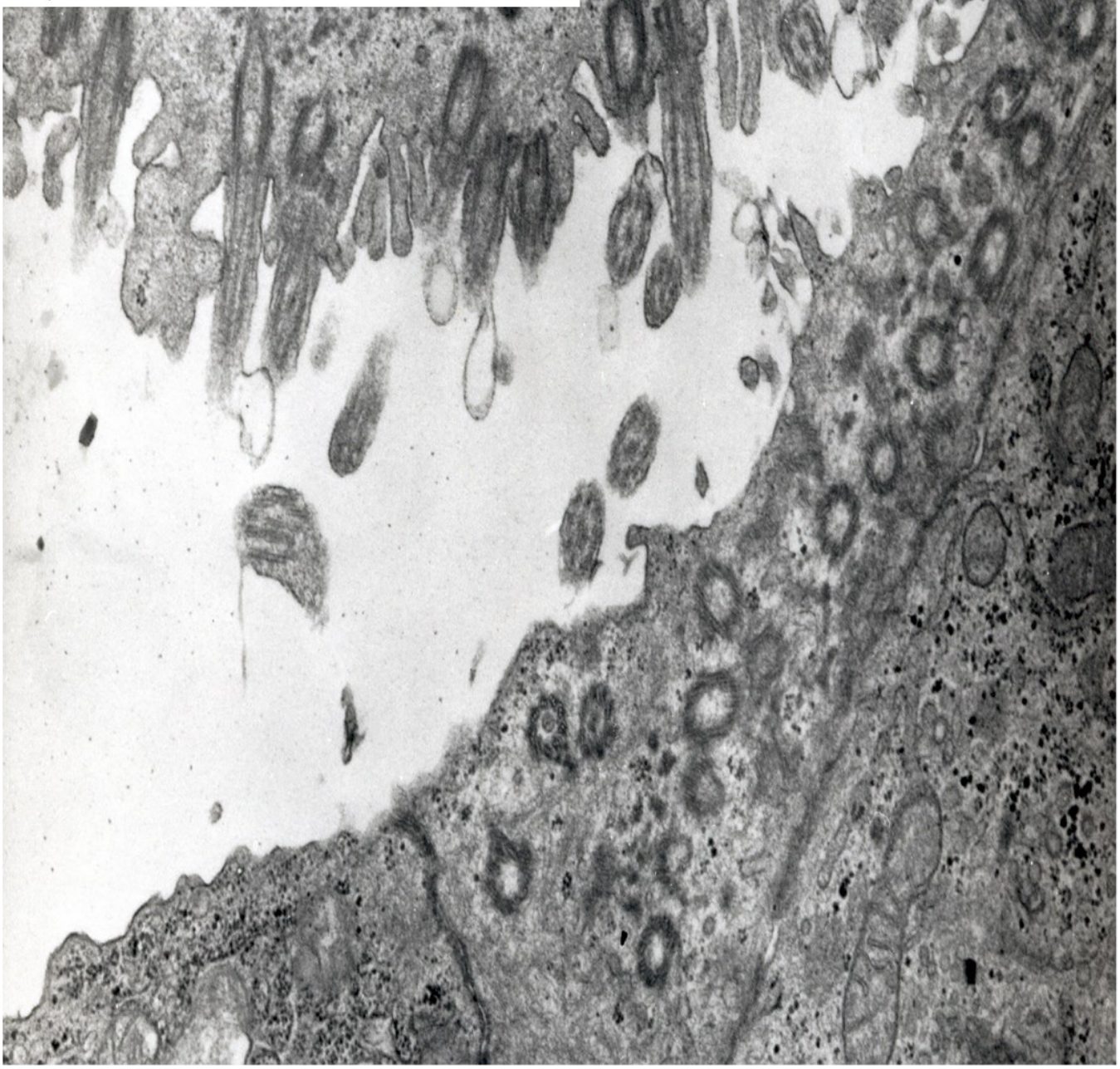


Intestino delgado - Cílios - 40000X

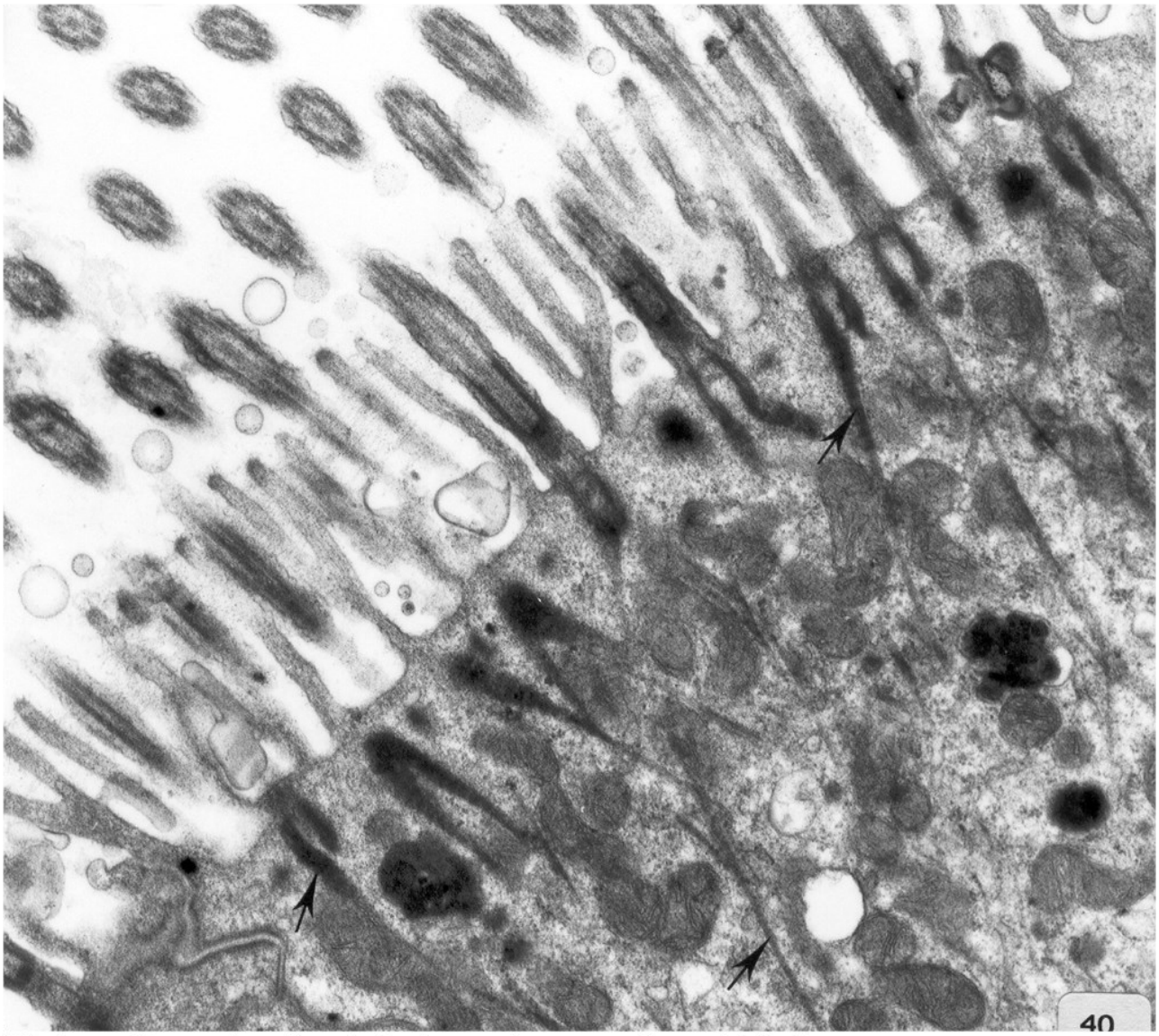
Citoesqueleto: Cílios



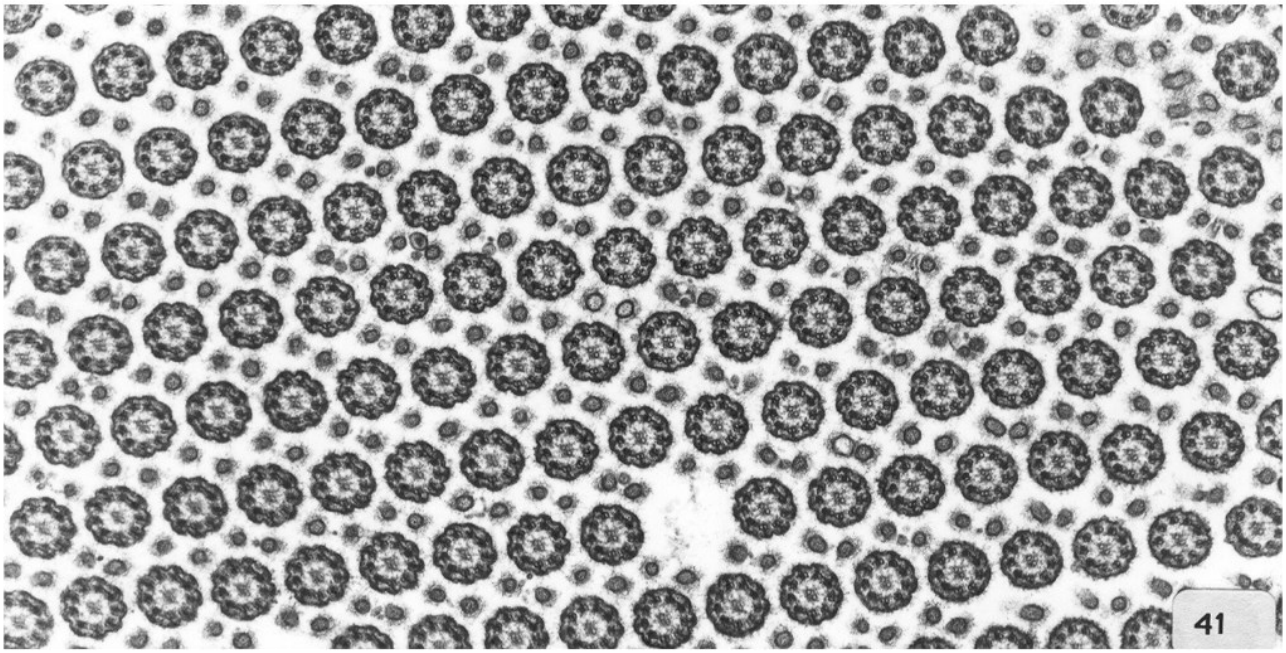
Traquéia - Cílios - 800X



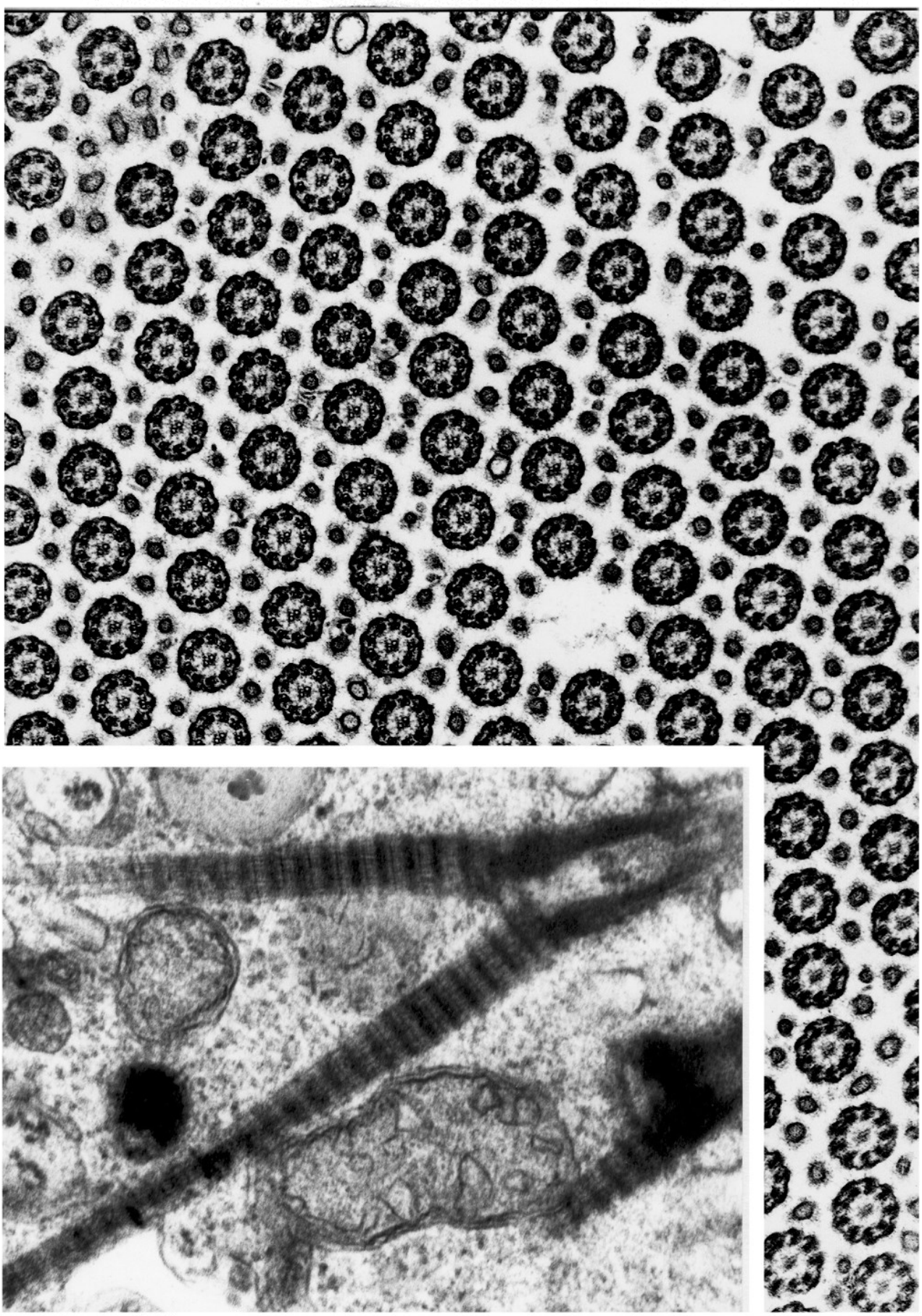
Traquéia - Cílios - 20000X



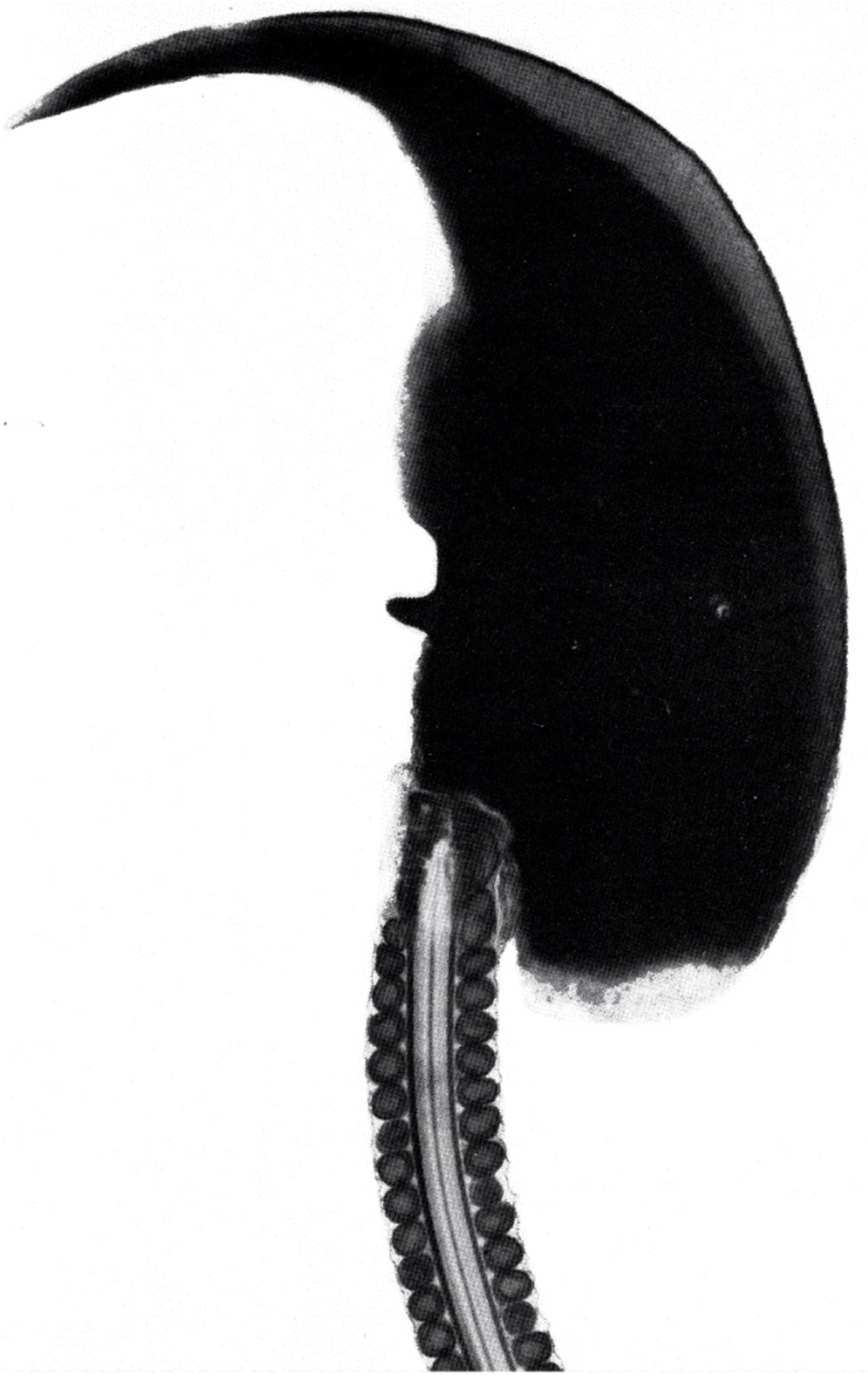
Cílios branquiais com raízes ciliares (acima) e cortados transversalmente (abaixo)



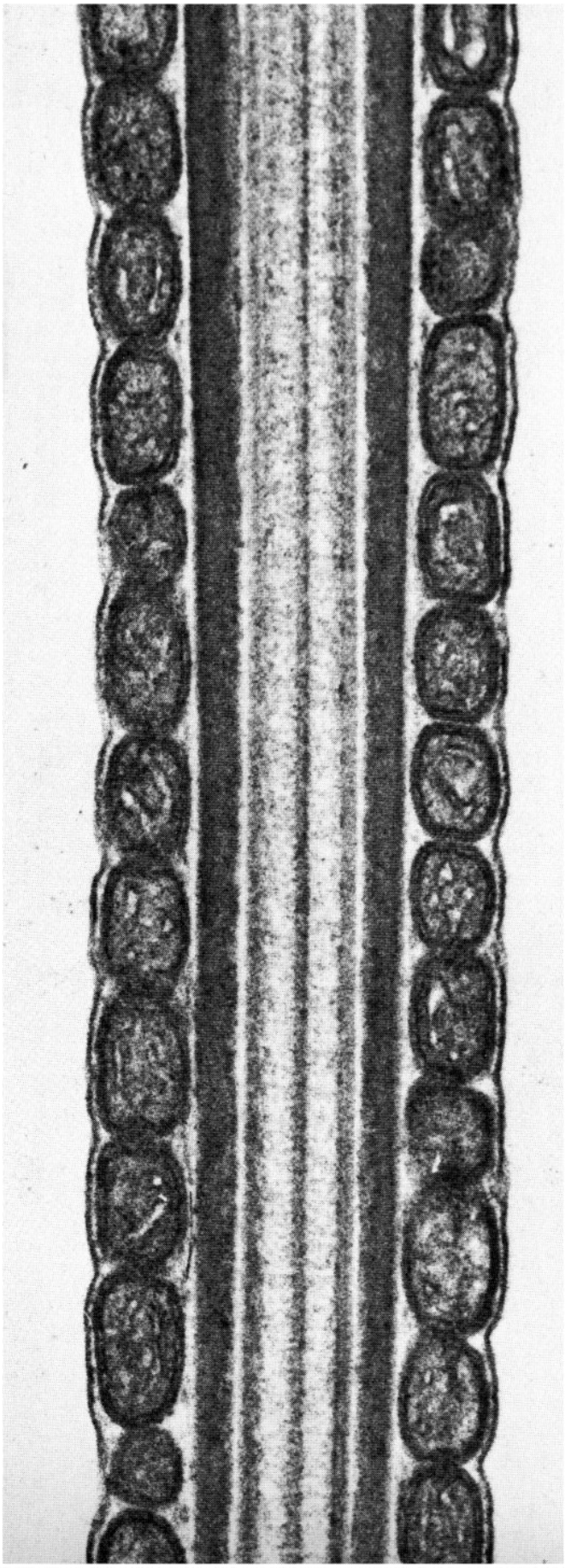
Citoesqueleto - Cílios



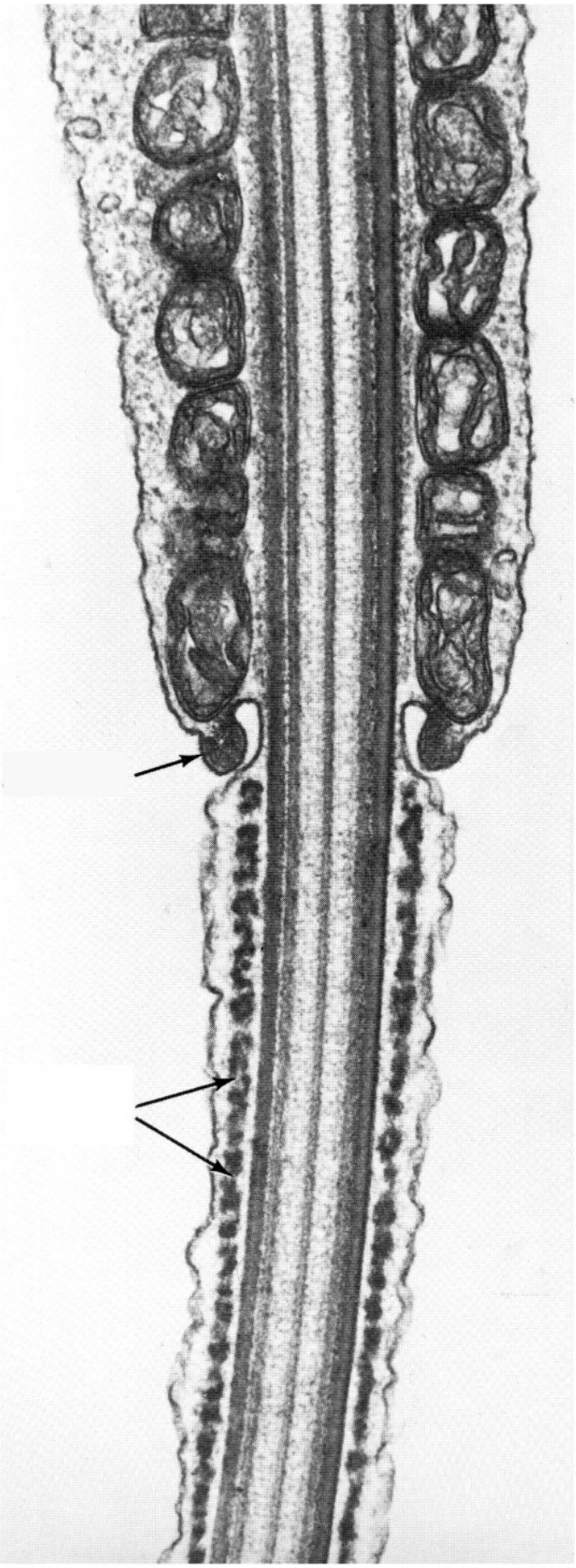
Raízes Ciliares - 90000X



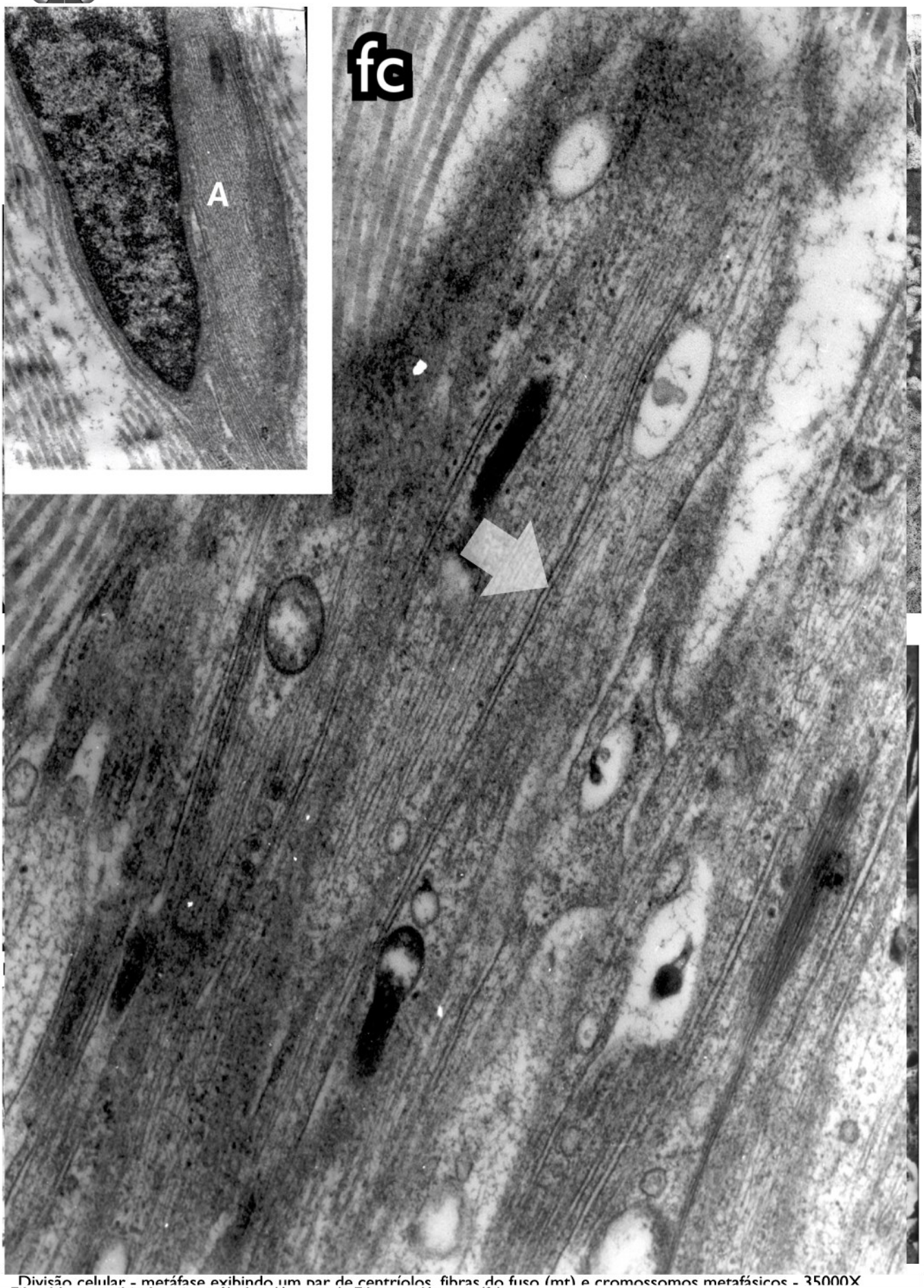
Espermatozoide de Camundongo



Peça média do espermatozóide

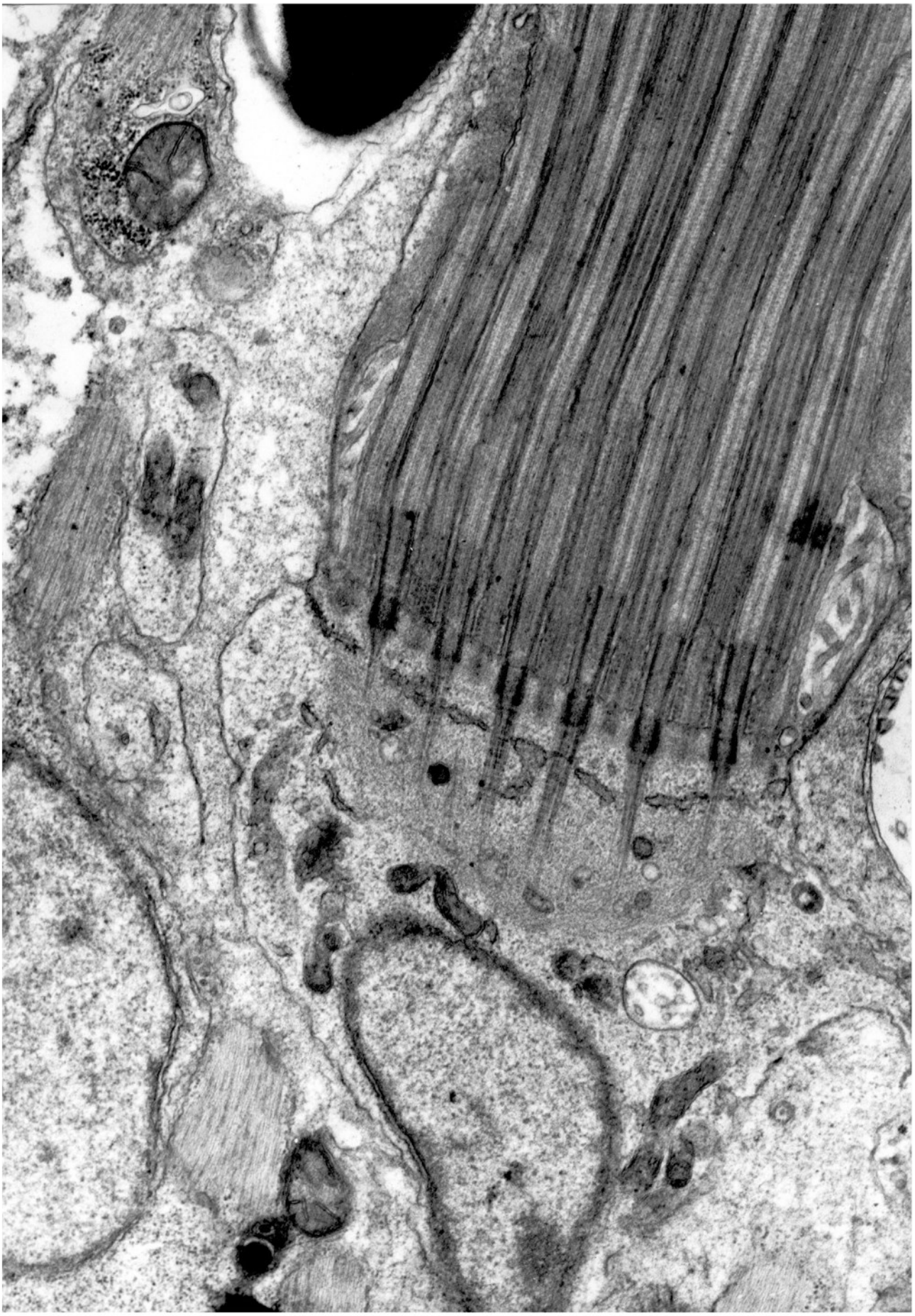


Junção entre as partes média e principal do espematozoide

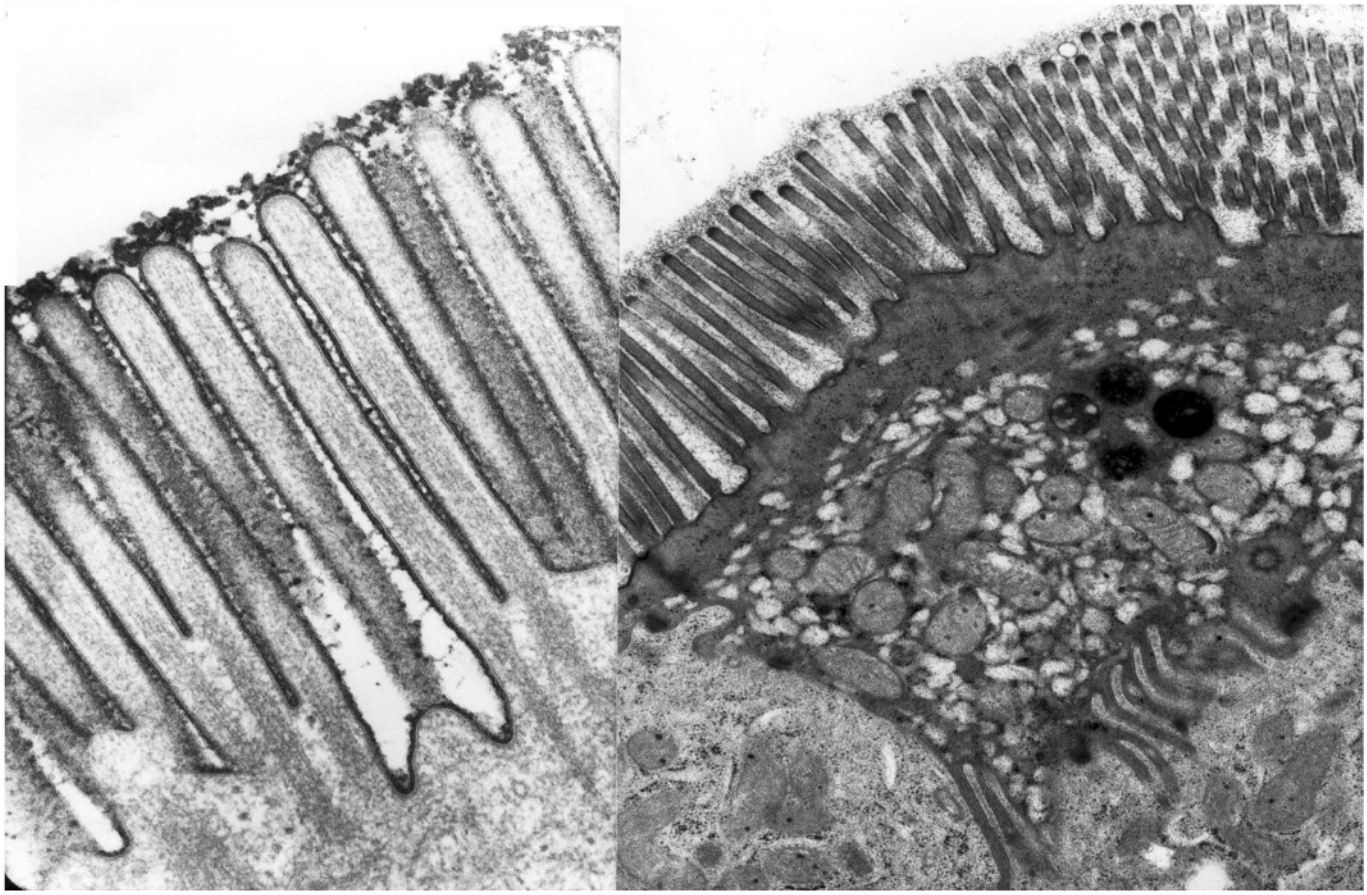


Divisão celular - metáfase exibindo um par de centríolos, fibras do fuso (mt) e cromossomos metafásicos - 35000X
Fibroblasto exibindo microtúbulos (A e seta). Fibras colágenas (fc).

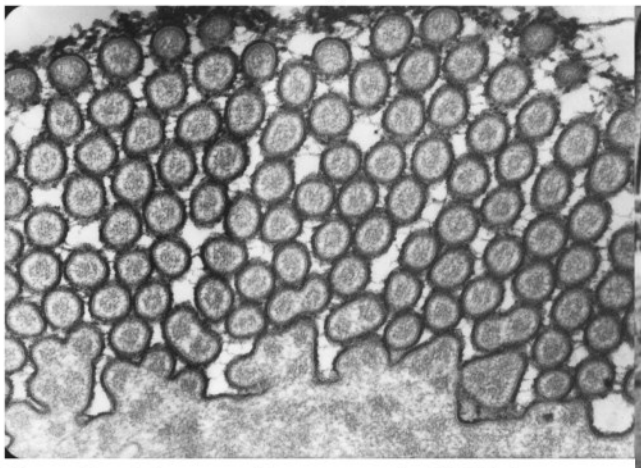
Divisão celular - metáfase exibindo um par de centríolos, fibras do fuso (mt) e cromossomos metafásicos - 35000X



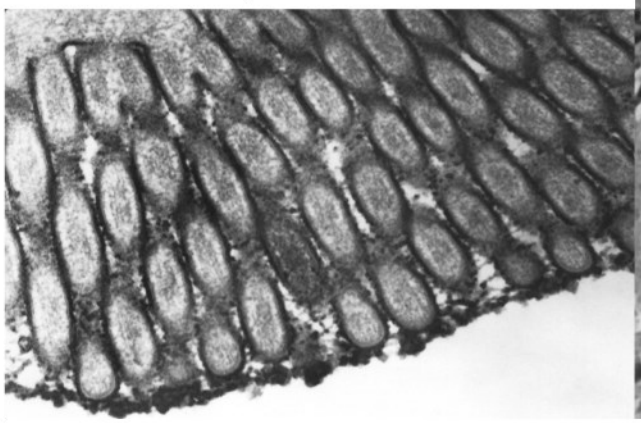
Citoesqueleto - Filamentos



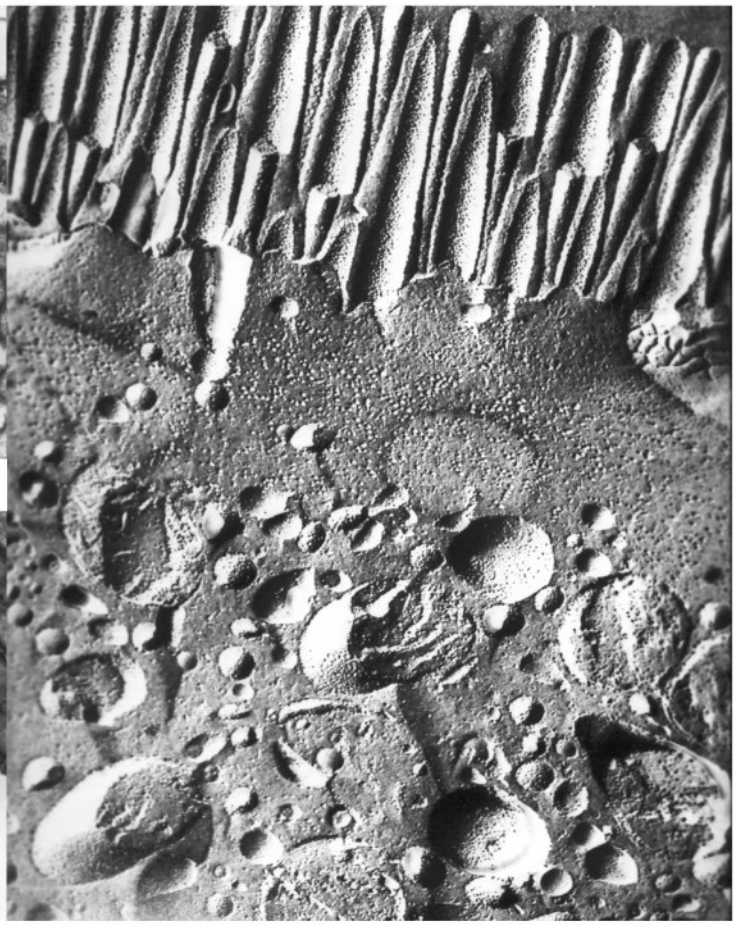
Intestino delgado - Microvilosidades com glicocálice - cortes longitudinais - 40000X / 4000X



Microvilosidades - secção transversal - 50000X

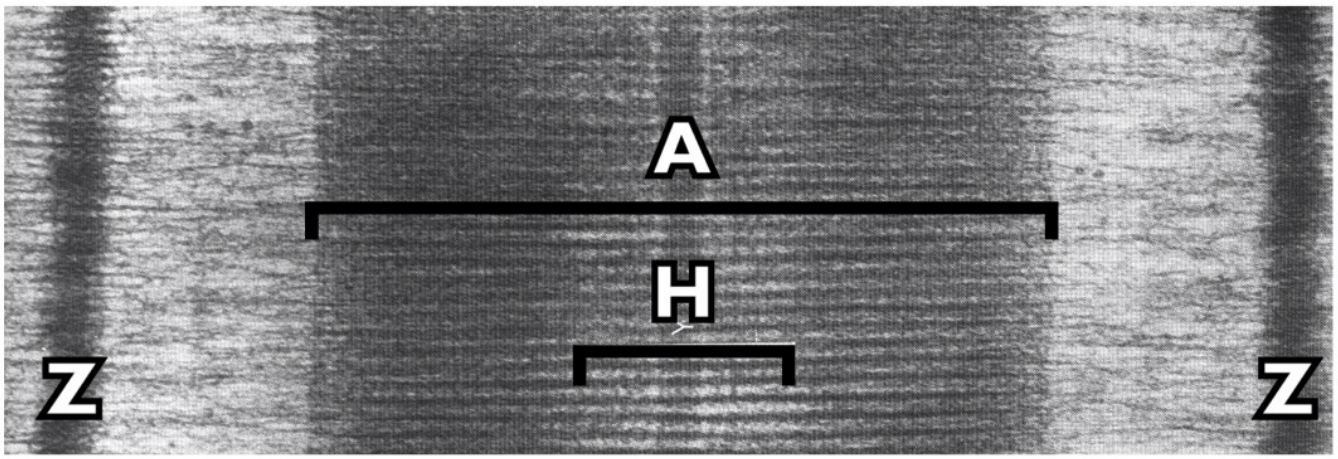


Microvilosidades - 50000X

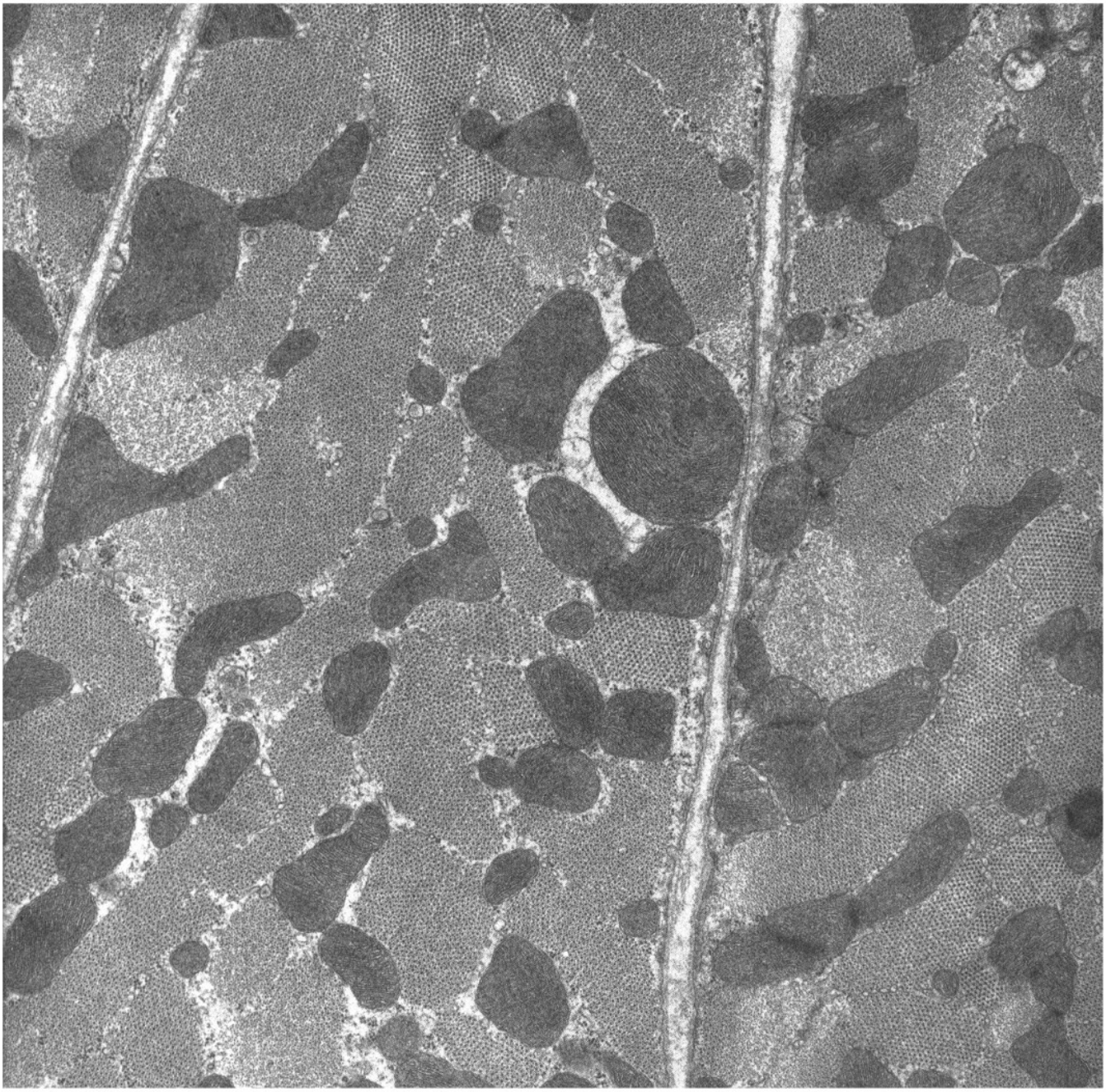


Intestino delgado - Fratura após congelação

Citoesqueleto - Filamentos

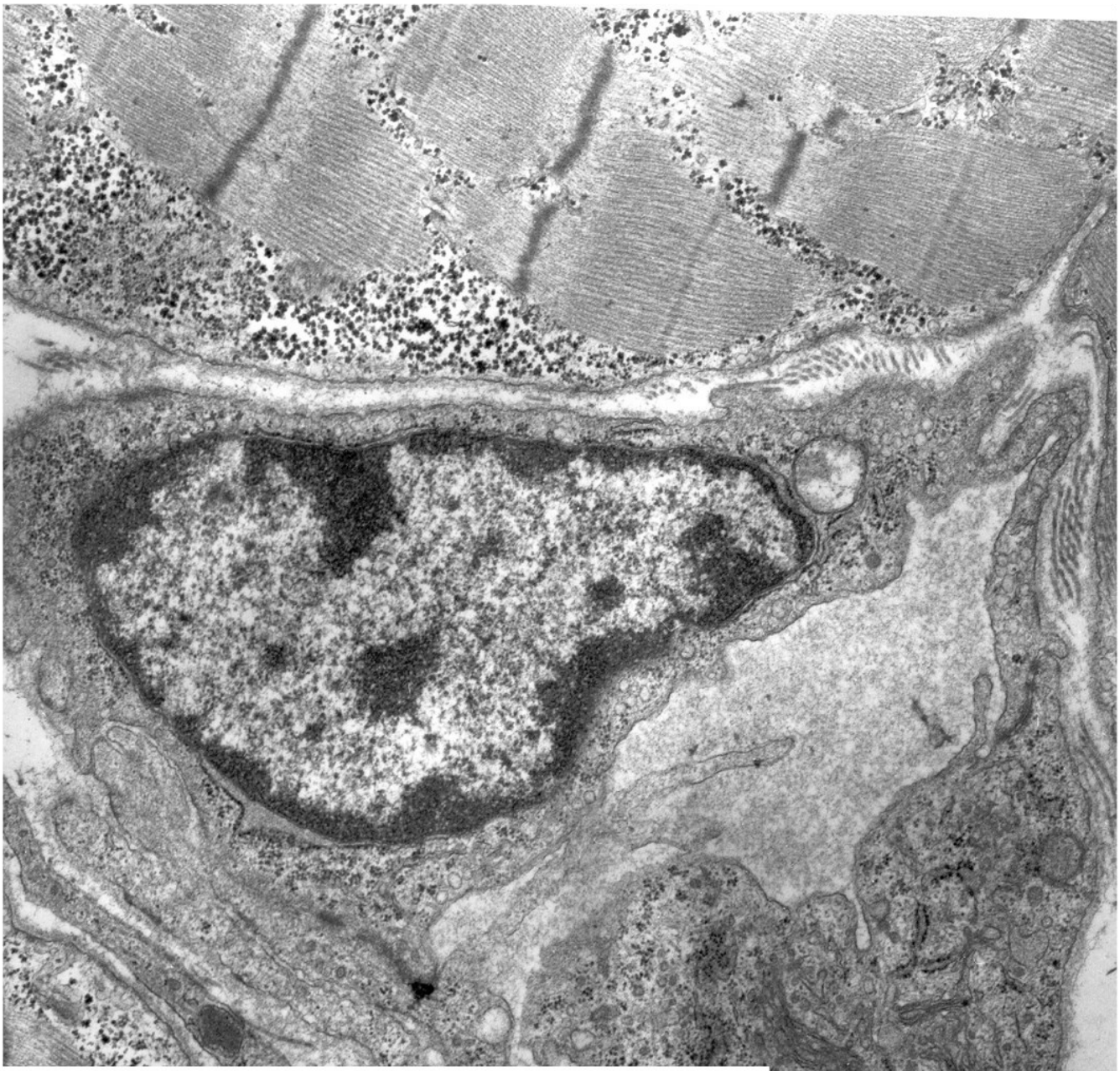


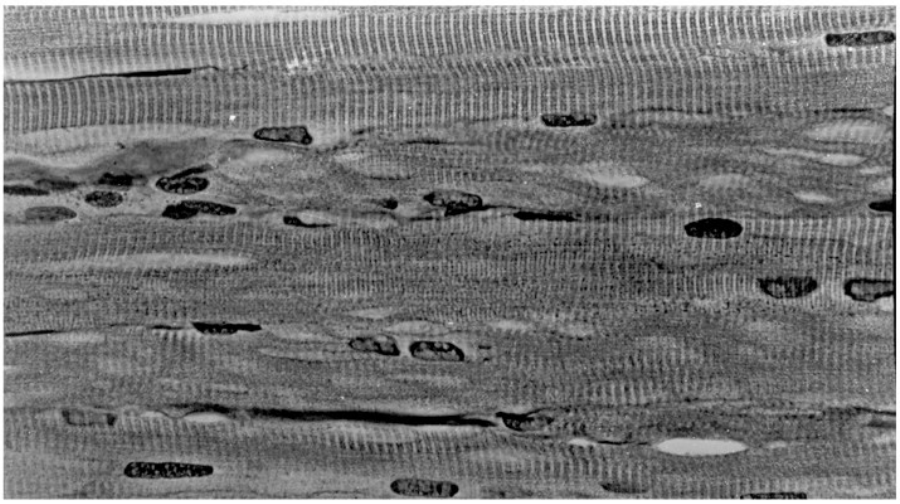
Sarcômero - 50000X



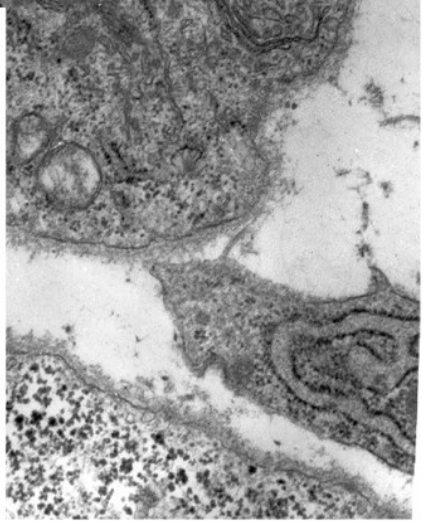
Músculo Cardíaco - 15000X

Citoesqueleto - Filamentos



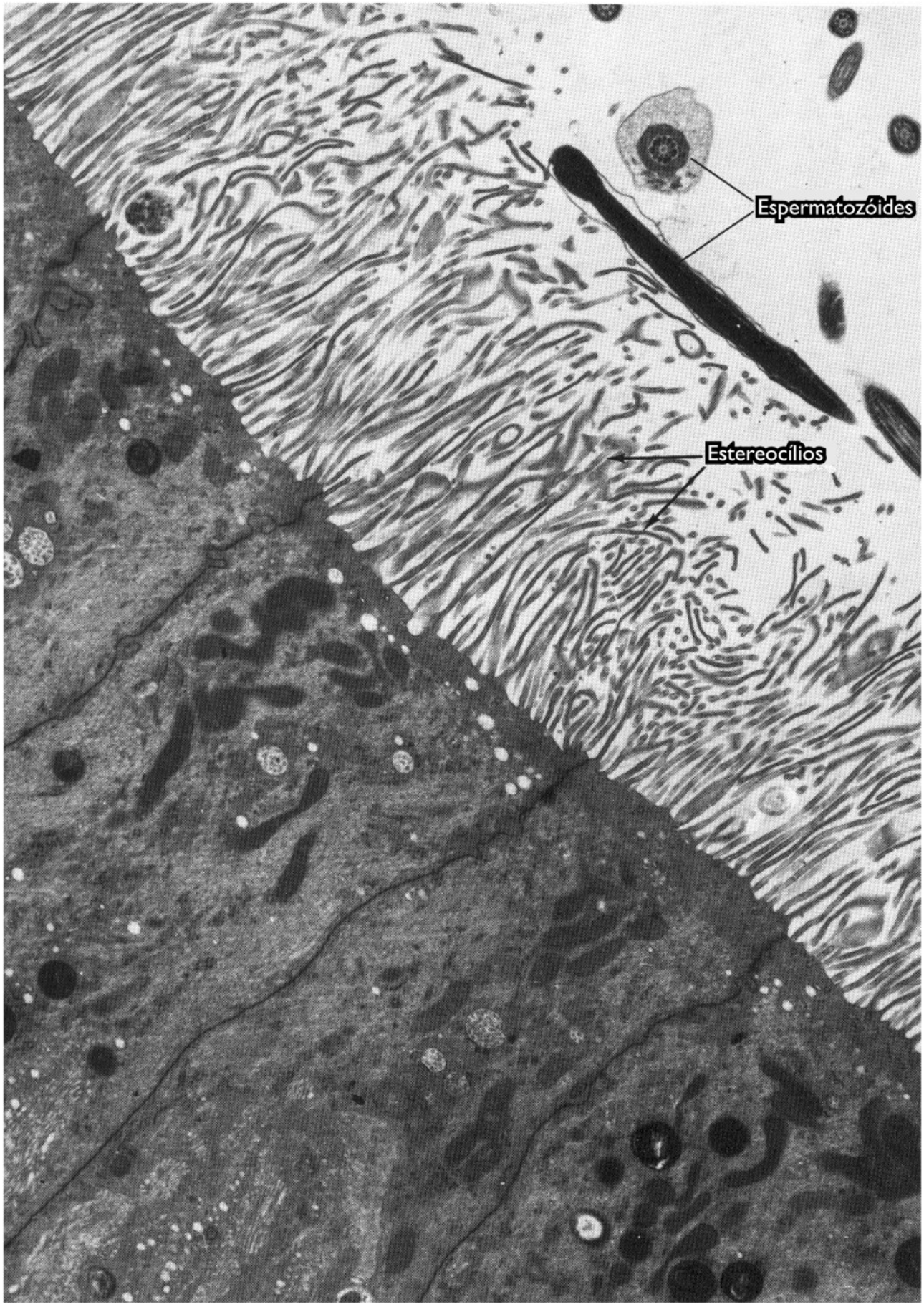


MO - Músculo Esquelético - 90X



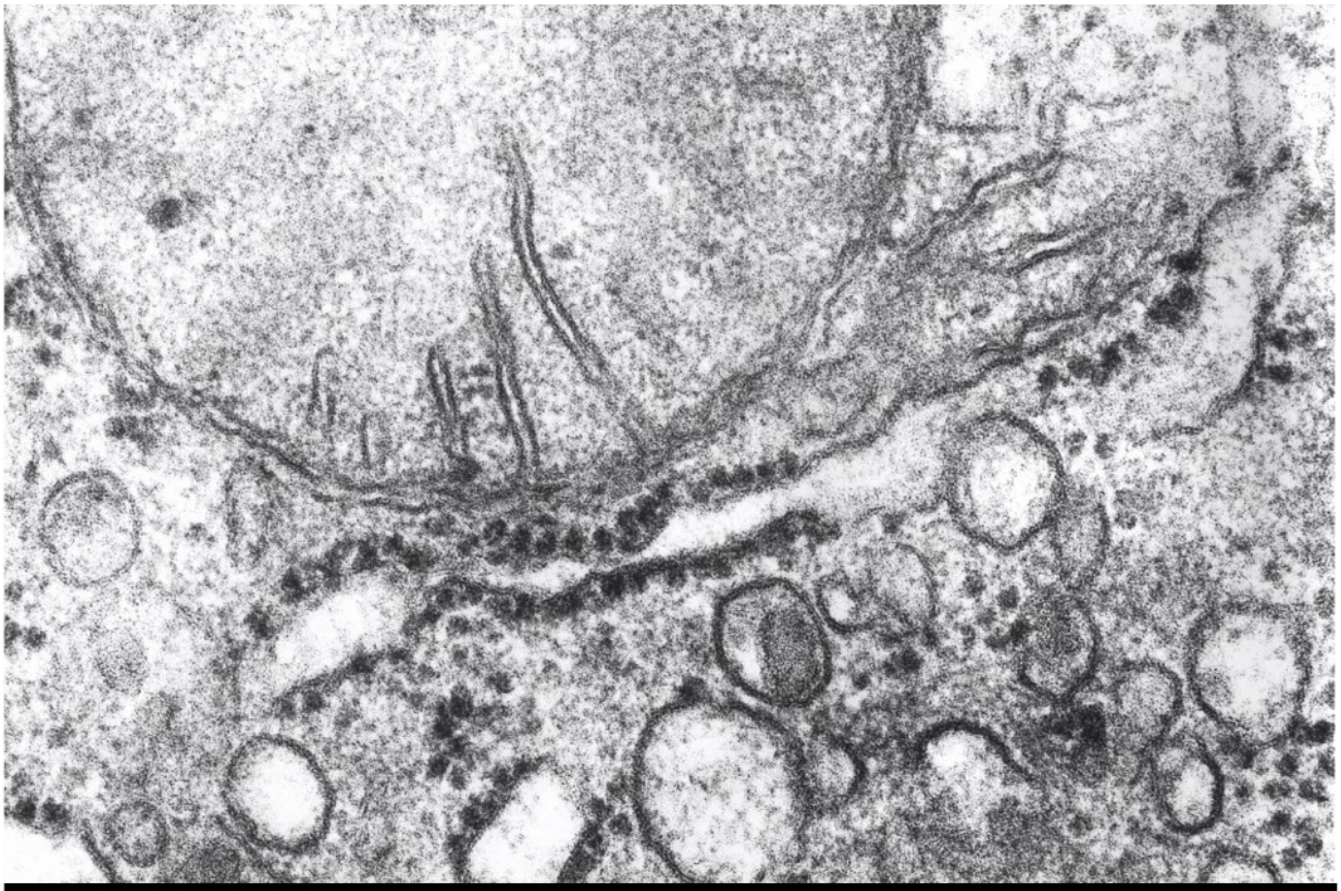
Diafragma - 10000X

Fibra muscular estriada cardíaca - 40000X

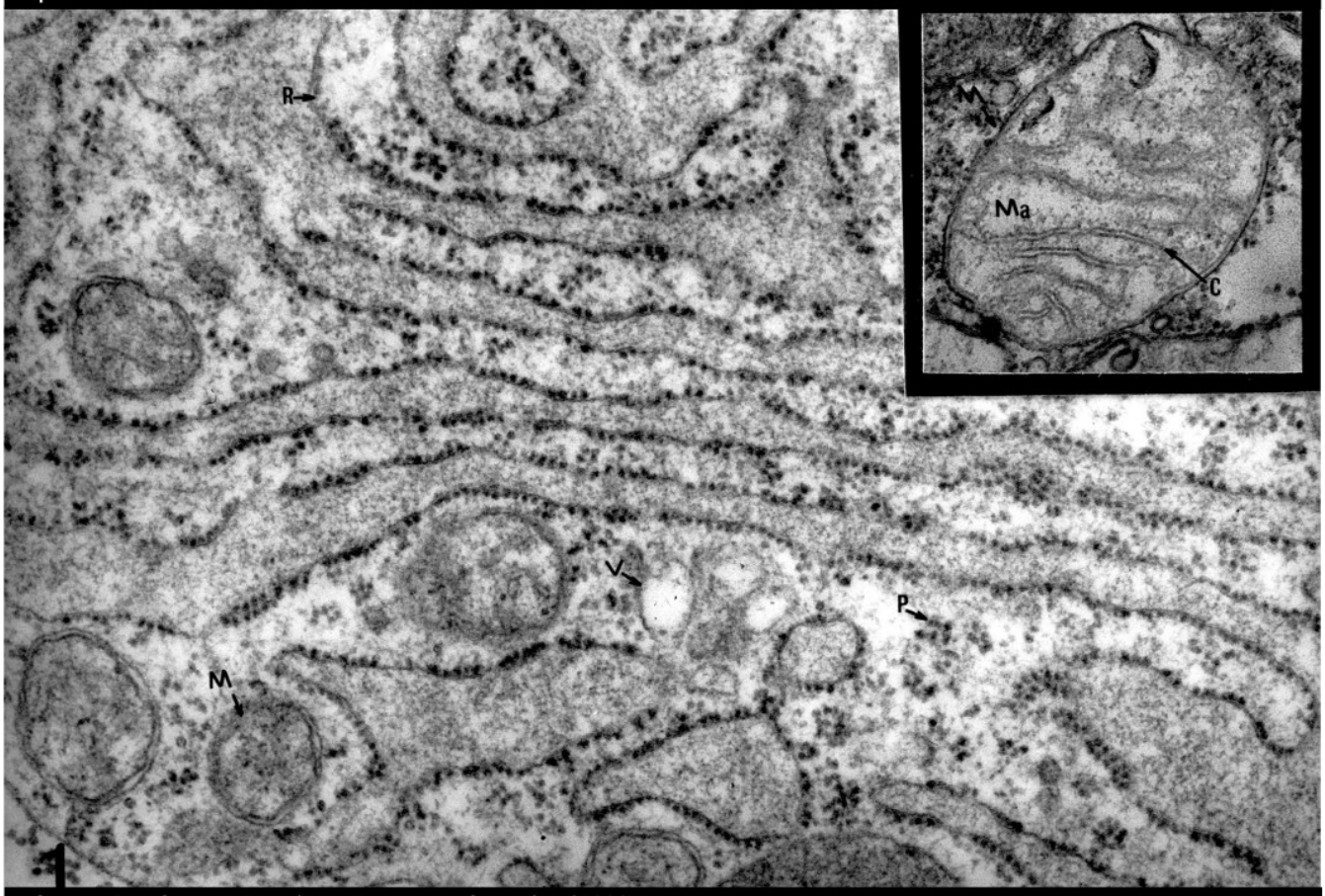


Estereocílios

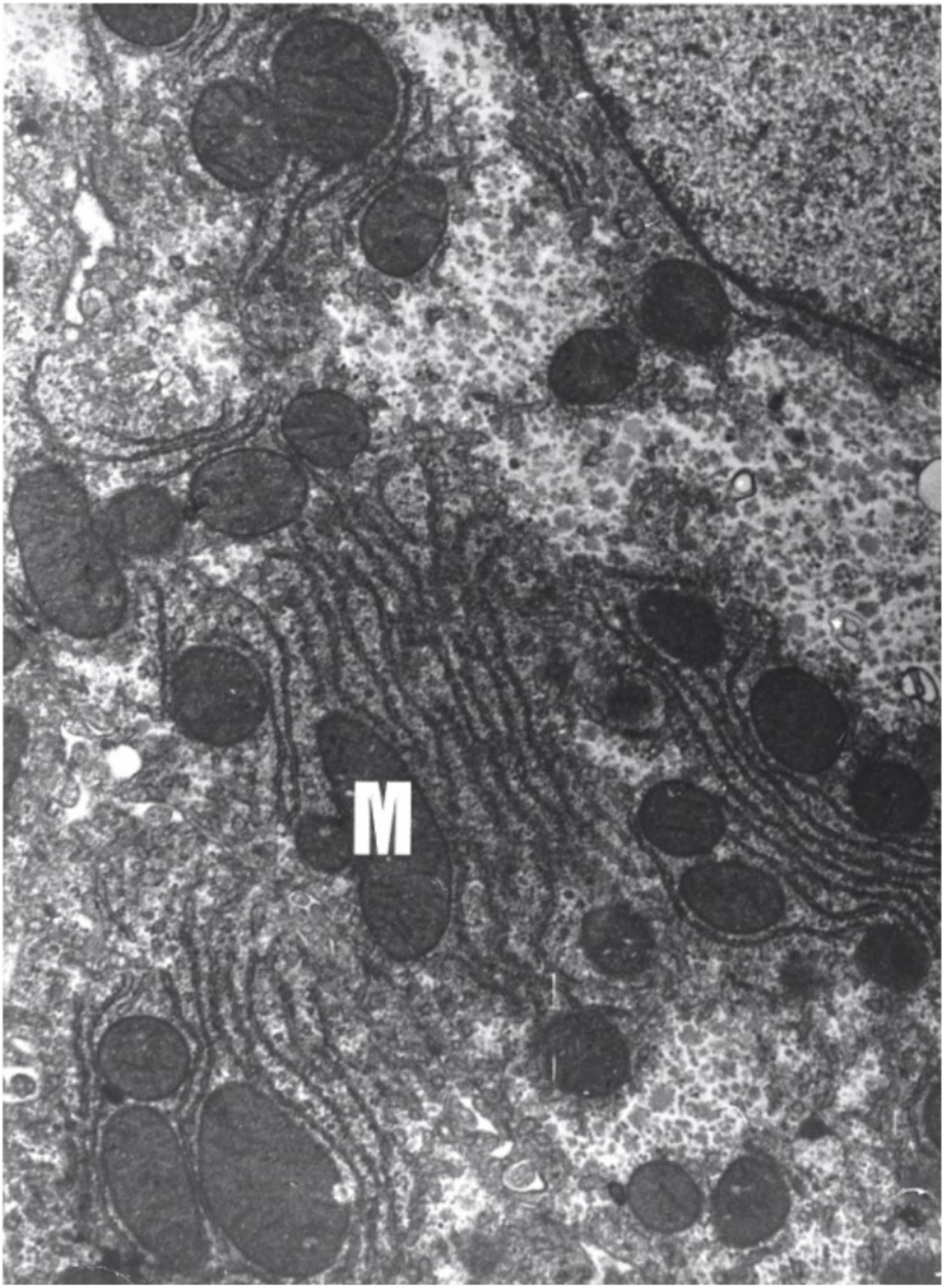
Secreção Celular - Retículo Endoplasmático Rugoso



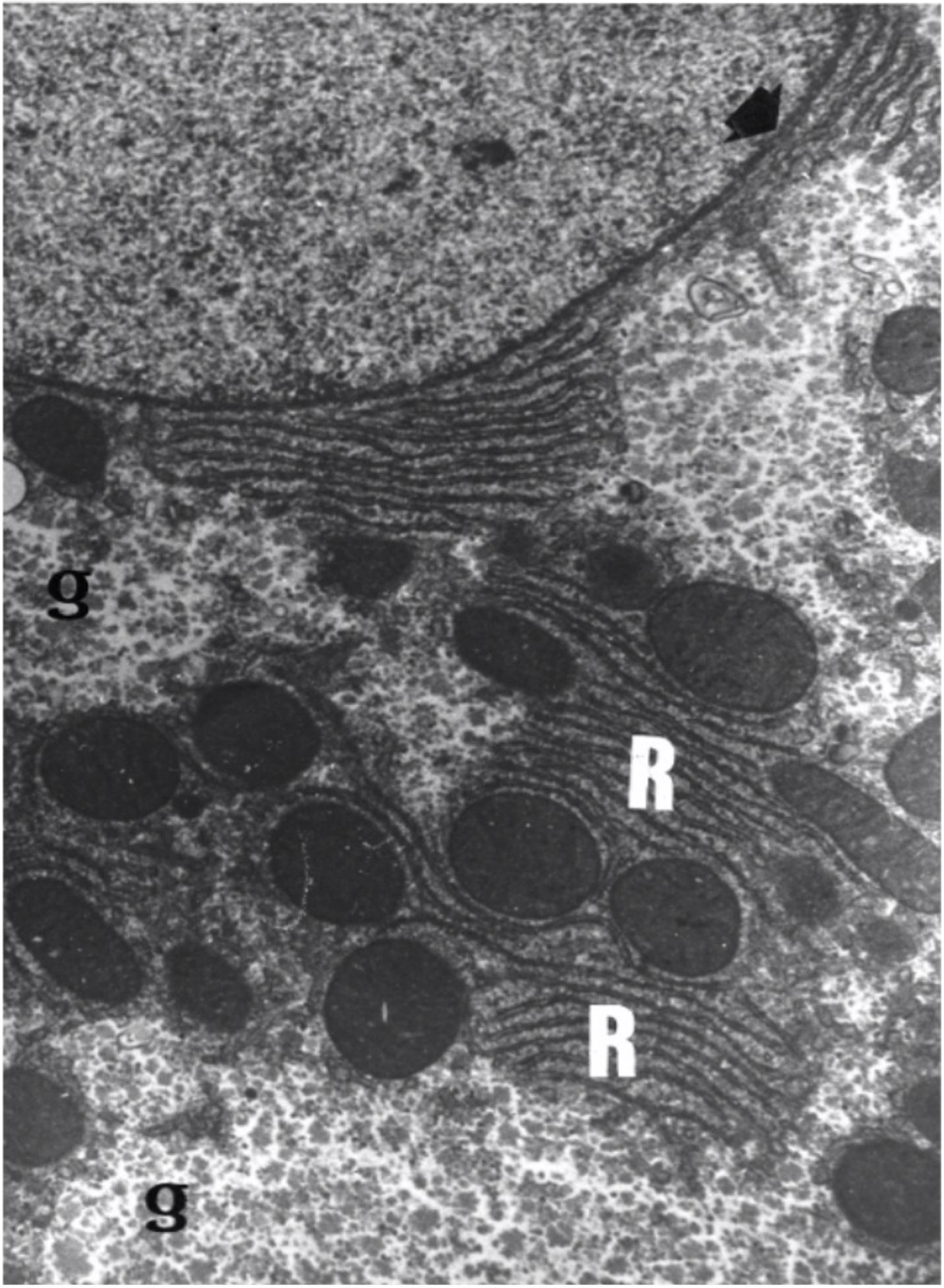
Hepatócito - RER - 125000X



Músculo Cardíaco - RER - (Detalhe - Mitocôndria) - 46000X

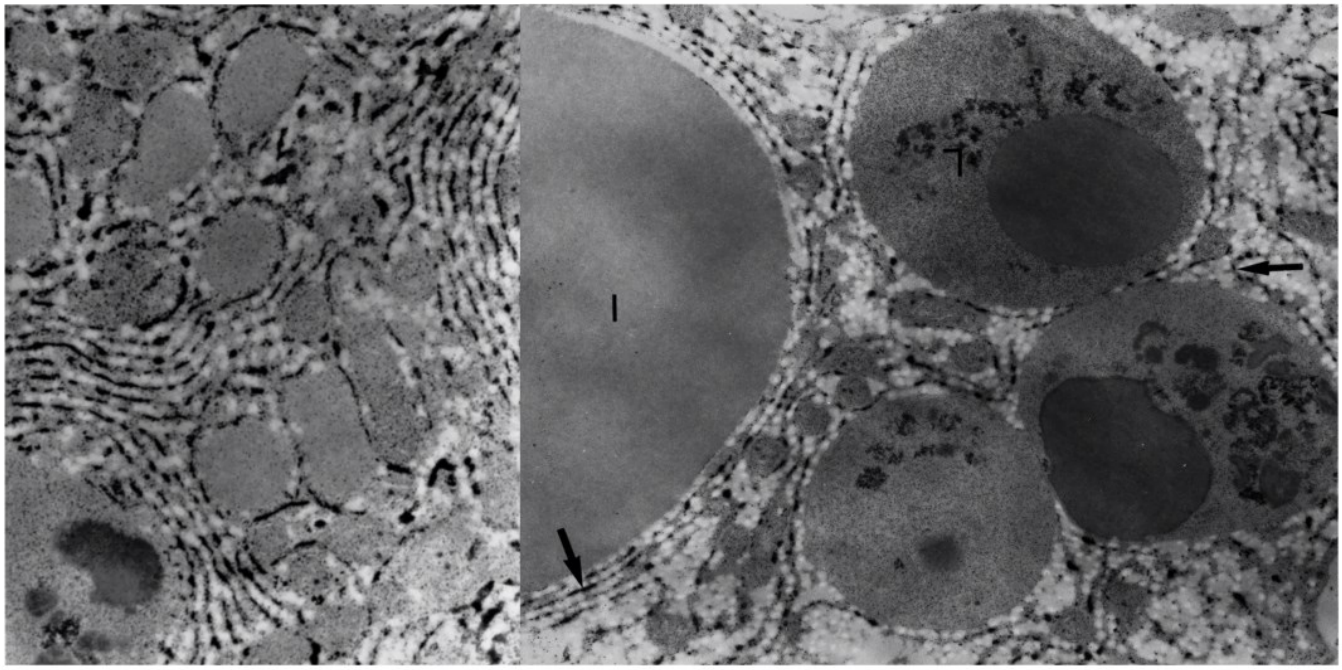


Retículo Endoplasmático Rugoso / Mitocôndrias - 70000X

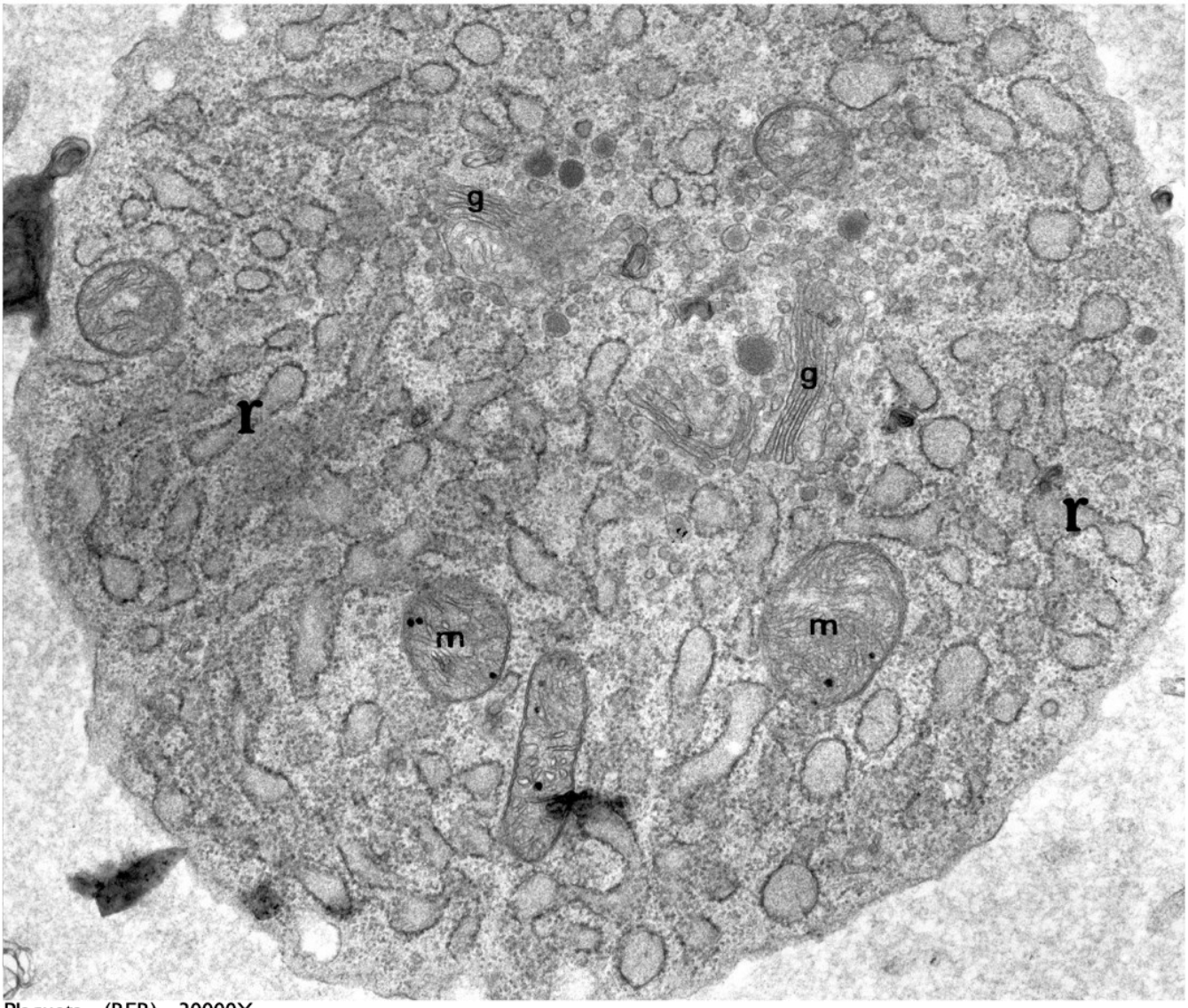


Retículo Endoplasmático Rugoso / Envoltório Nuclear / Mitocôndrias - 70000X

Secreção Celular - Retículo Endoplasmático Rugoso / Grânulos de Secreção



Fígado - Glicose-6-fosfatase - (REL) - gotas Lipídicas - 8000X / 21000X



Plaqueta - (RER) - 30000X

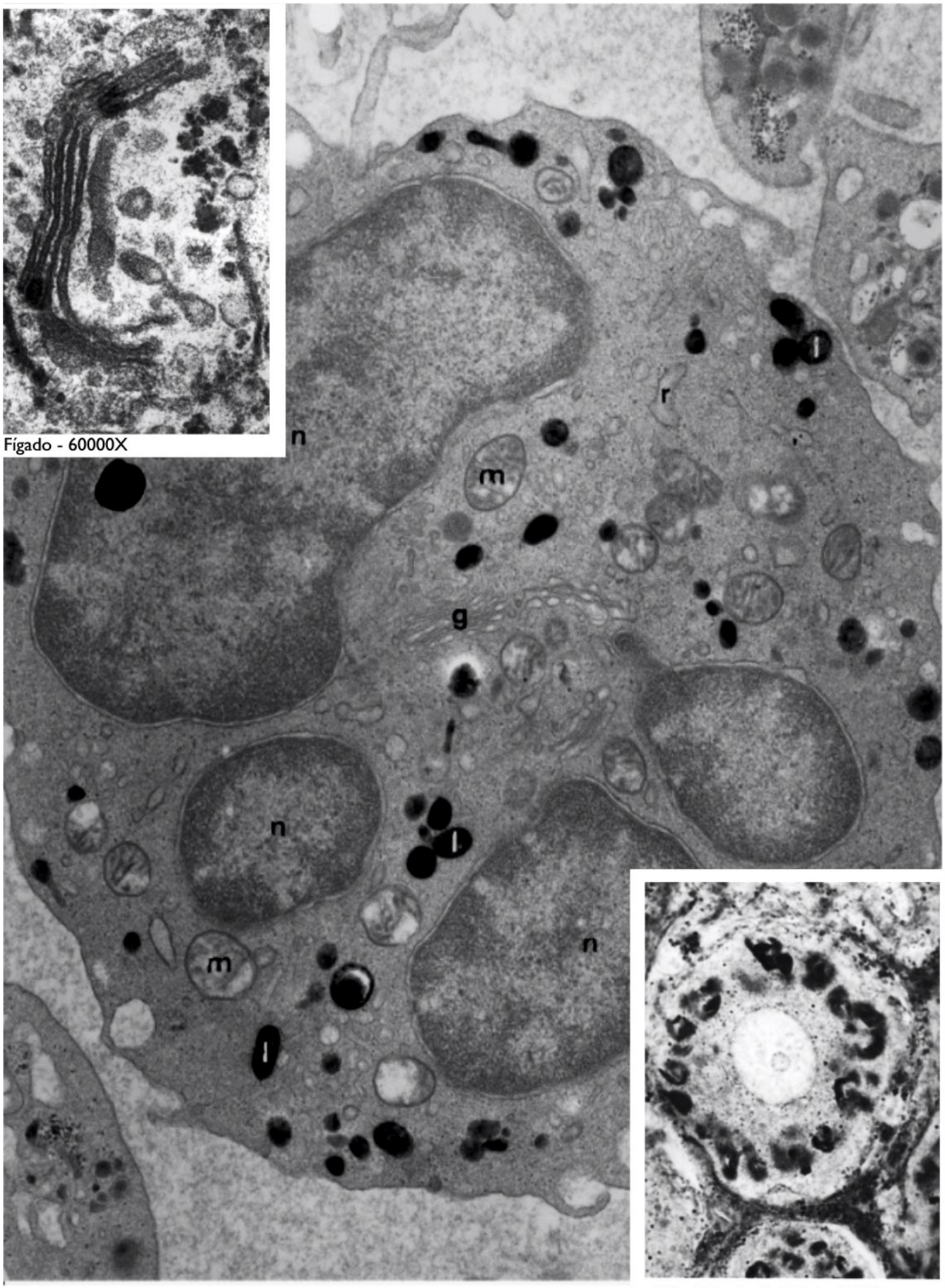
Secreção Celular - Retículo Endoplasmático Rugoso / Grânulos de Secreção

Célula β da ilhota de Langerhans - Grânulos de insulina - 400X

Pâncreas: a - célula α / b - célula β / c - célula acinosa - 20000X

Secreção Celular -Aparelho de Golgi

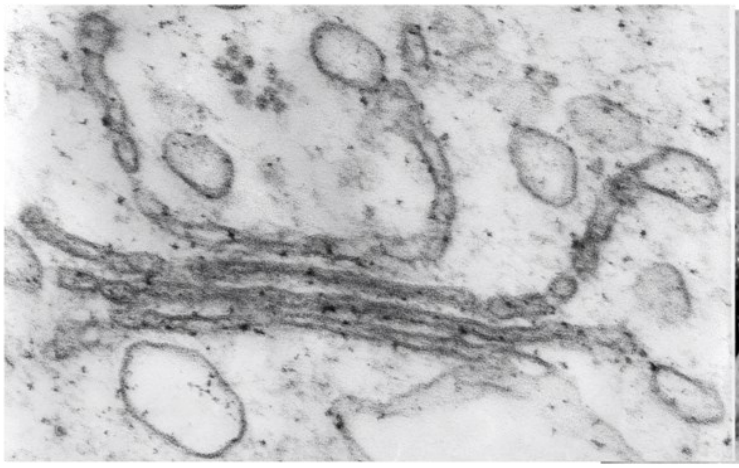
Fígado - 60000X



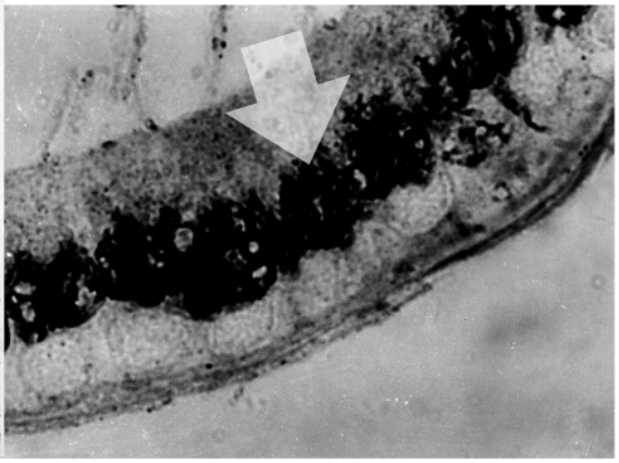
Leucócito - Aparelho de Golgi - 25000X

MO - Gânglio Espinhal - 900X

Secreção Celular - Aparelho de Golgi

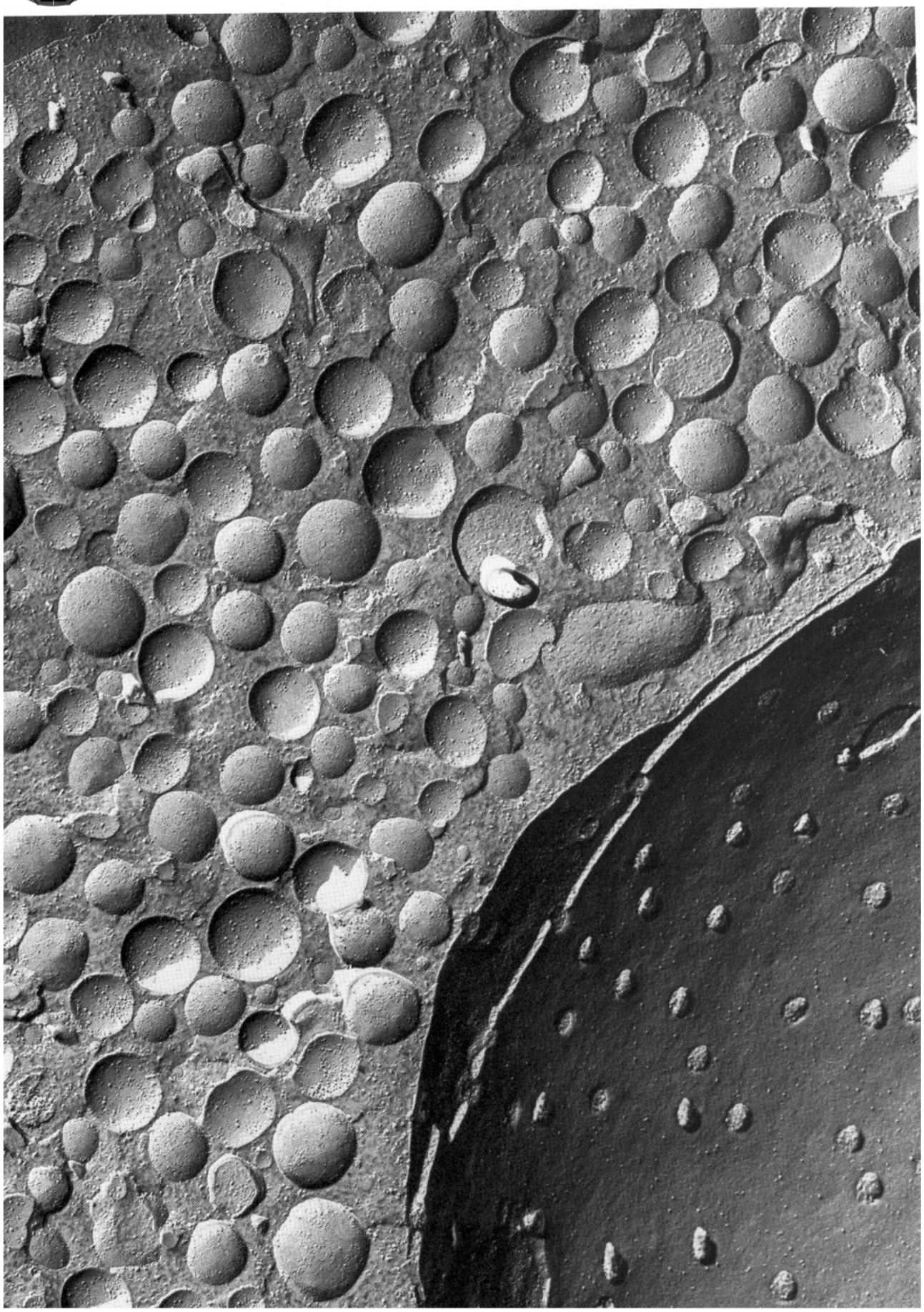


Célula do Milho - Aparelho de Golgi - 90000X

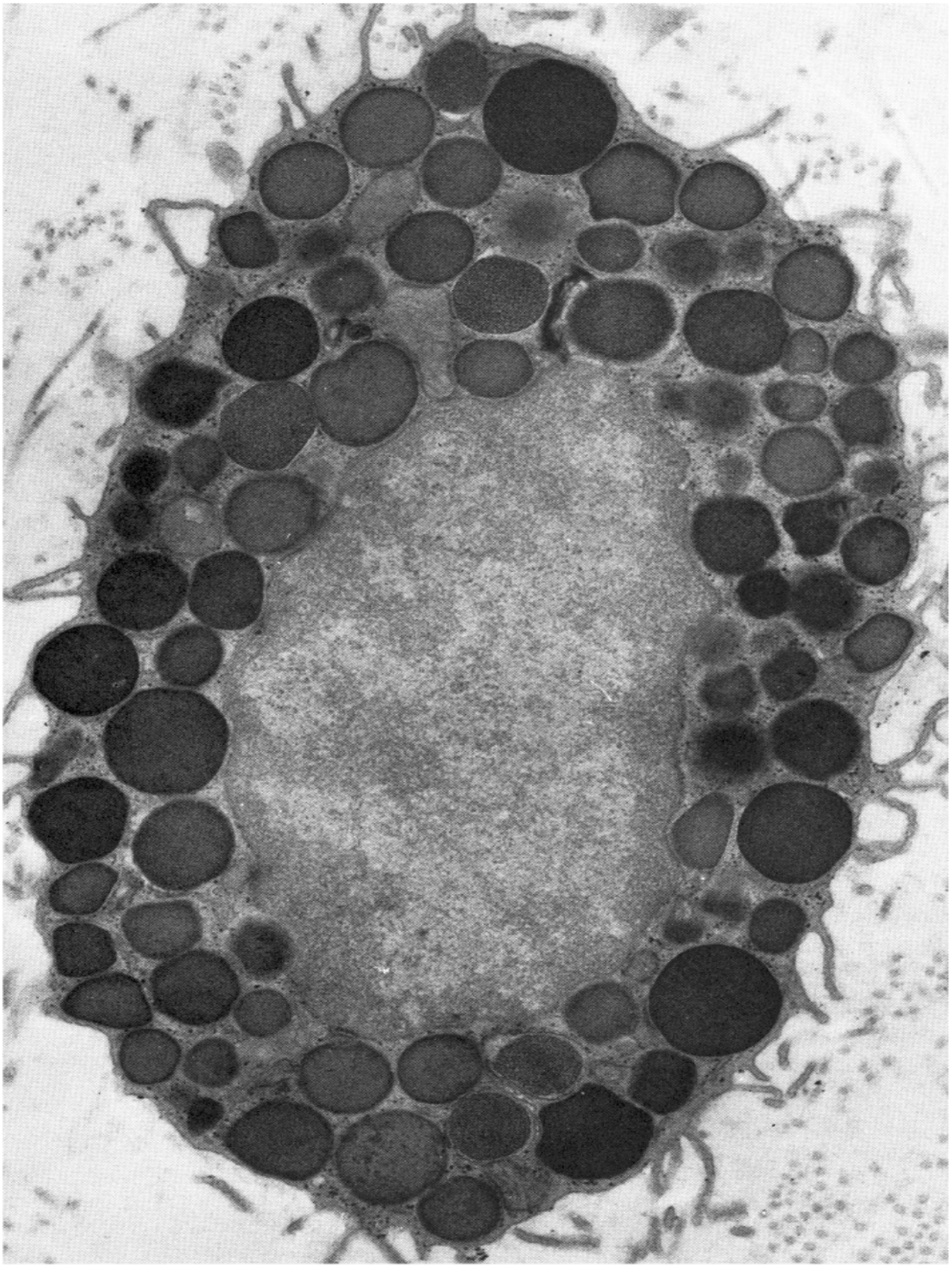


MO - Epidídimo - Aparelho de Golgi - 900X

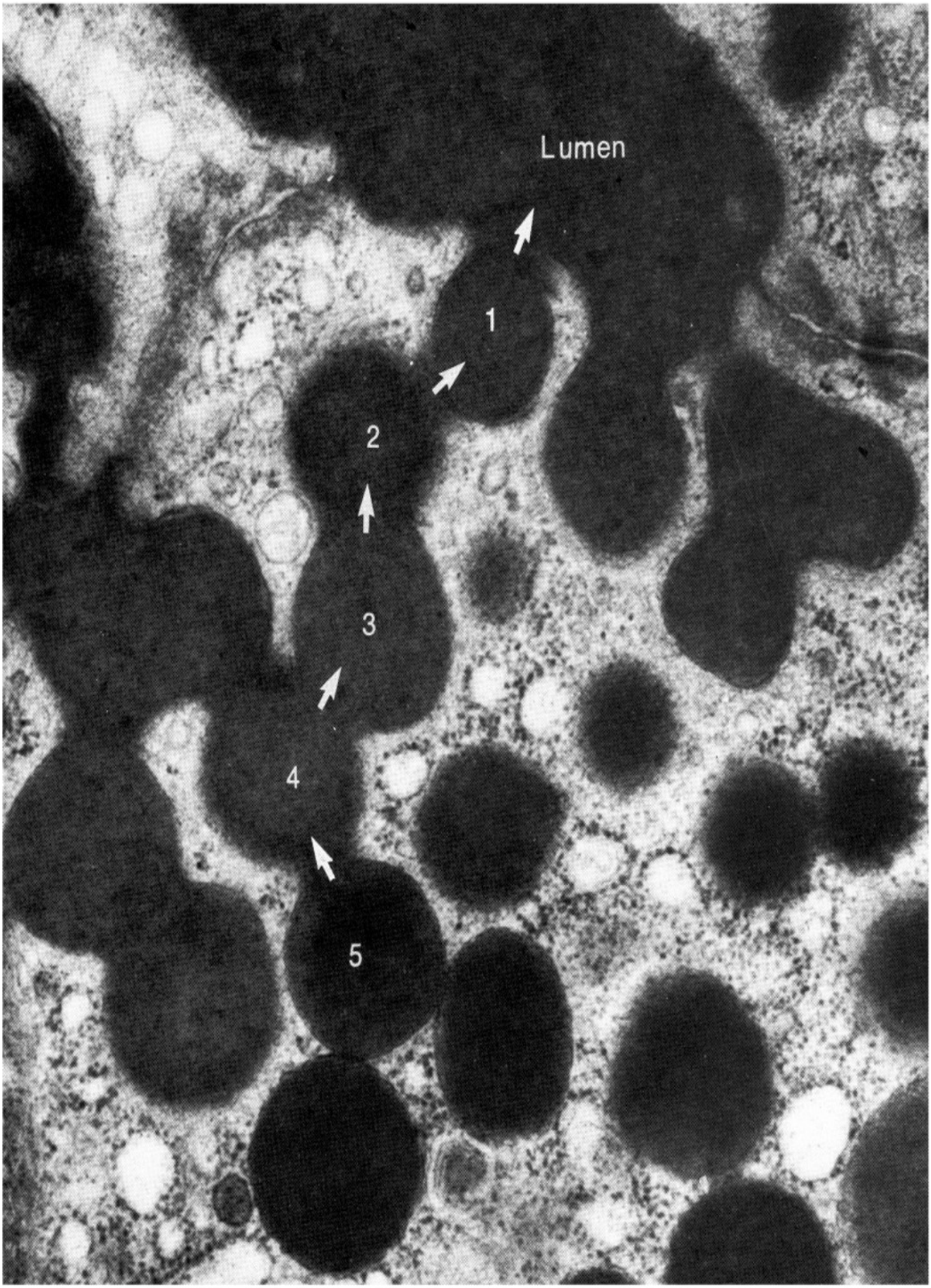
Leucócito - Aparelho de Golgi 25000X



Célula da medula adrenal de rato (Fratura-após-congelação)

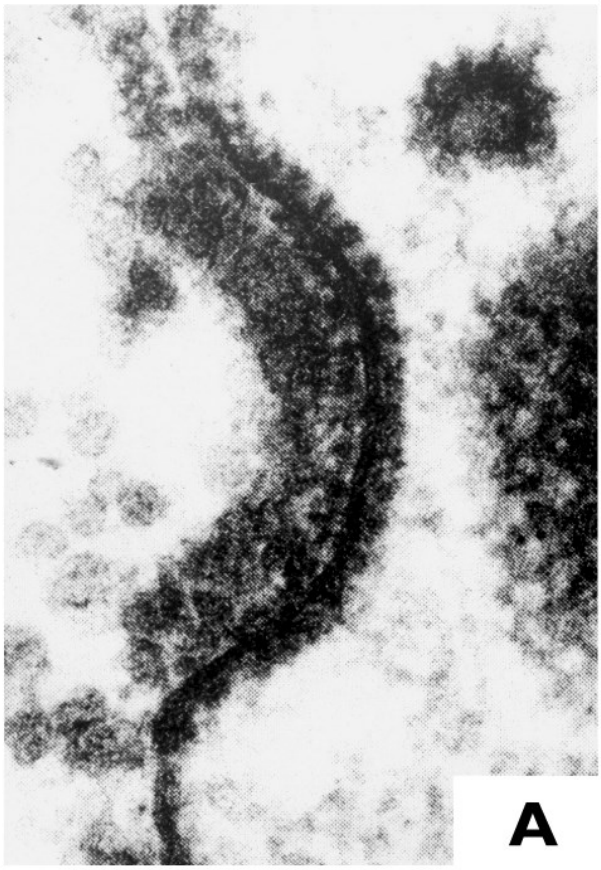


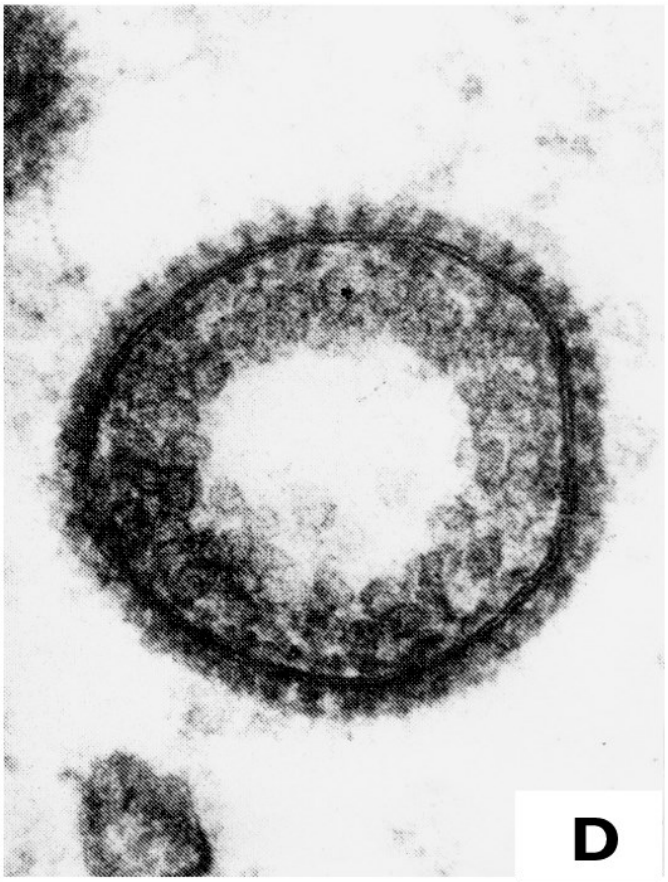
Mastócito do tecido conjuntivo de rato



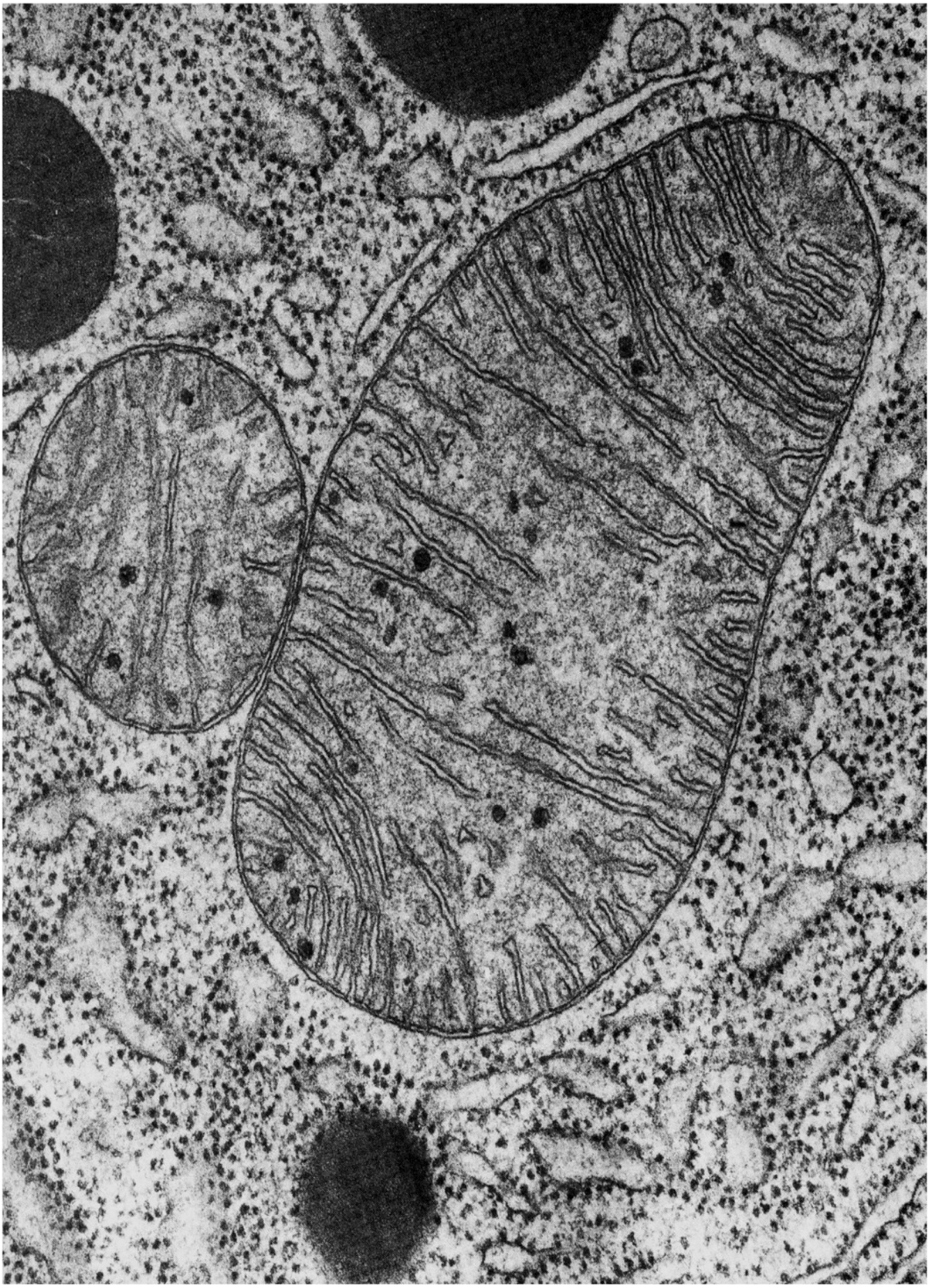
Região apical de uma célula acinar de pâncreas de cão

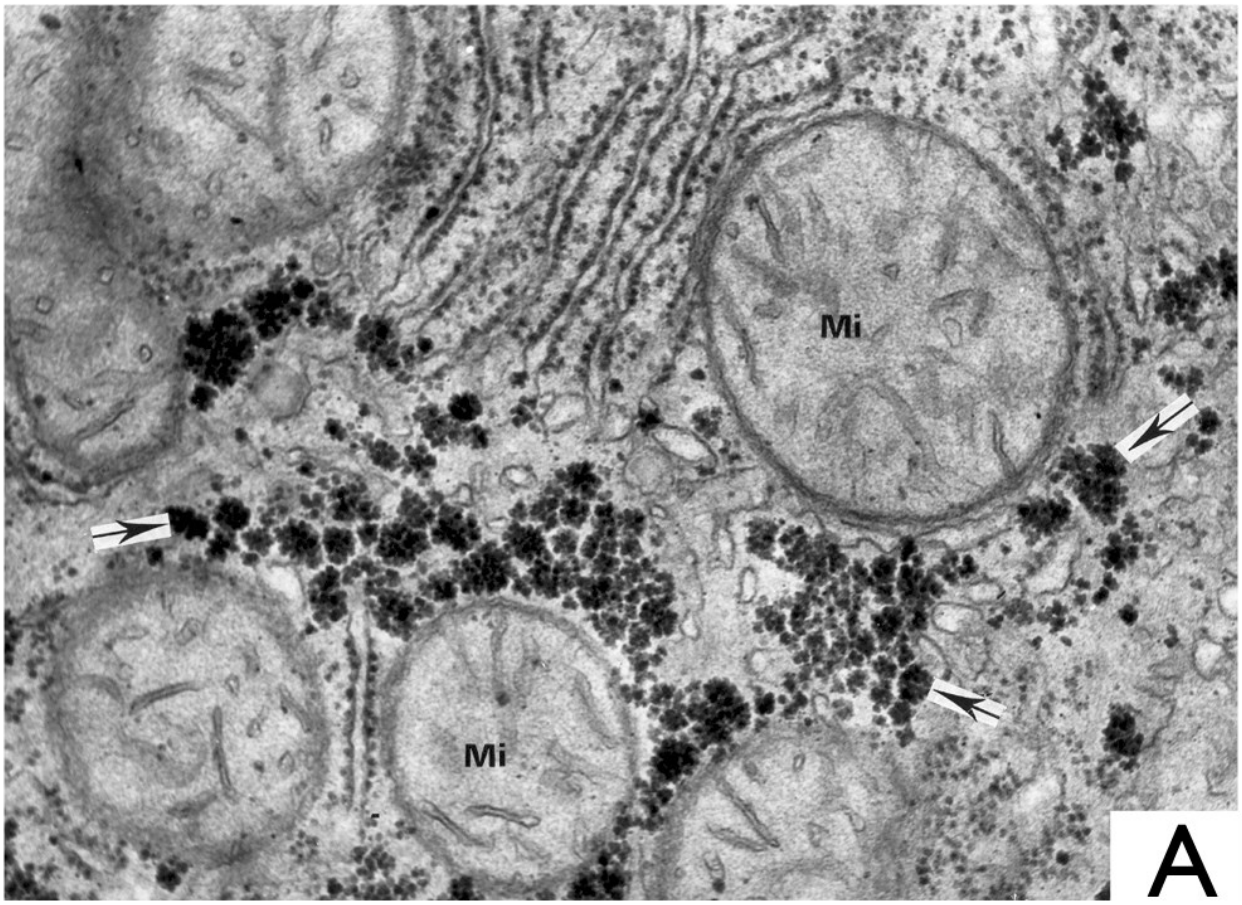
Formação de Vesícula Revestida por Clatrina



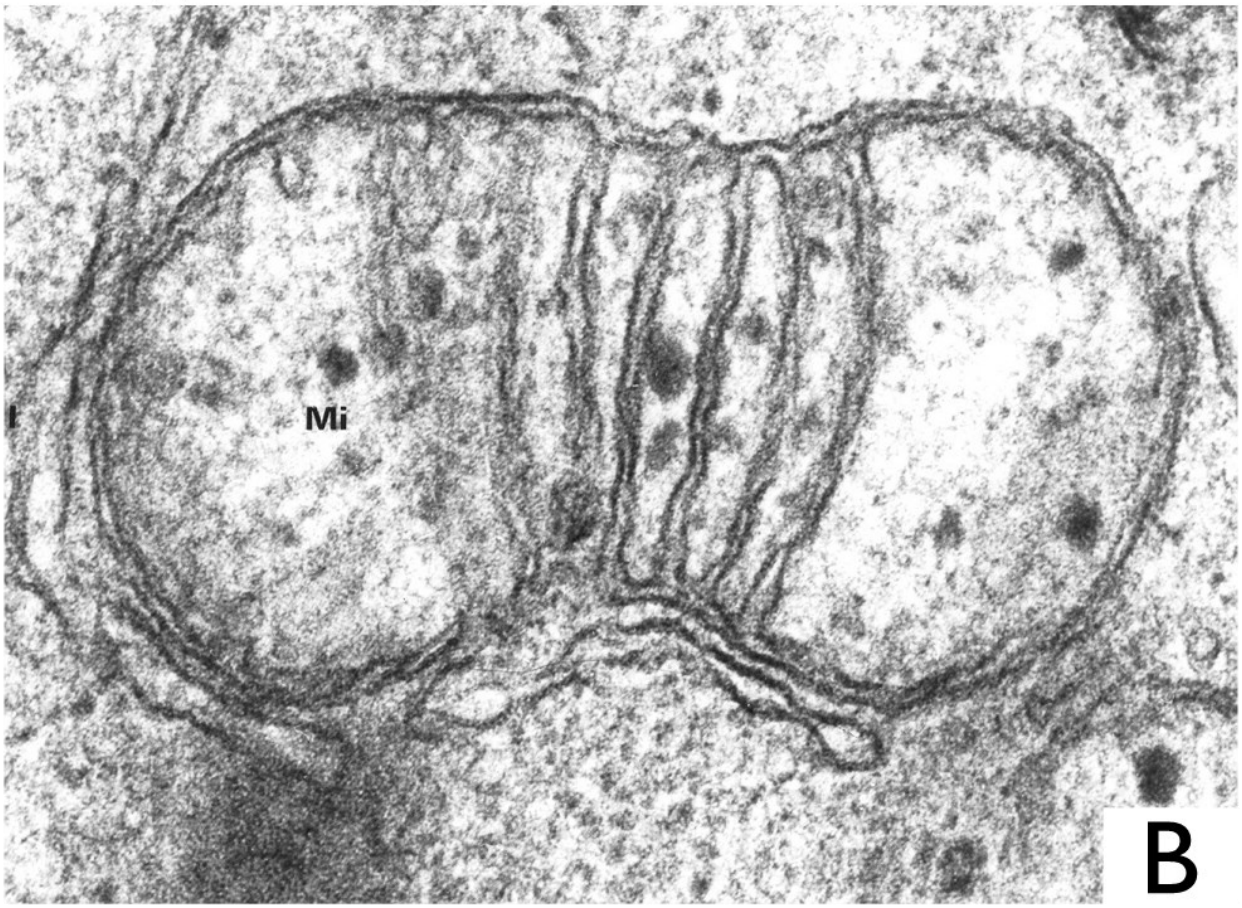


Produção de Energia - Mitocôndria

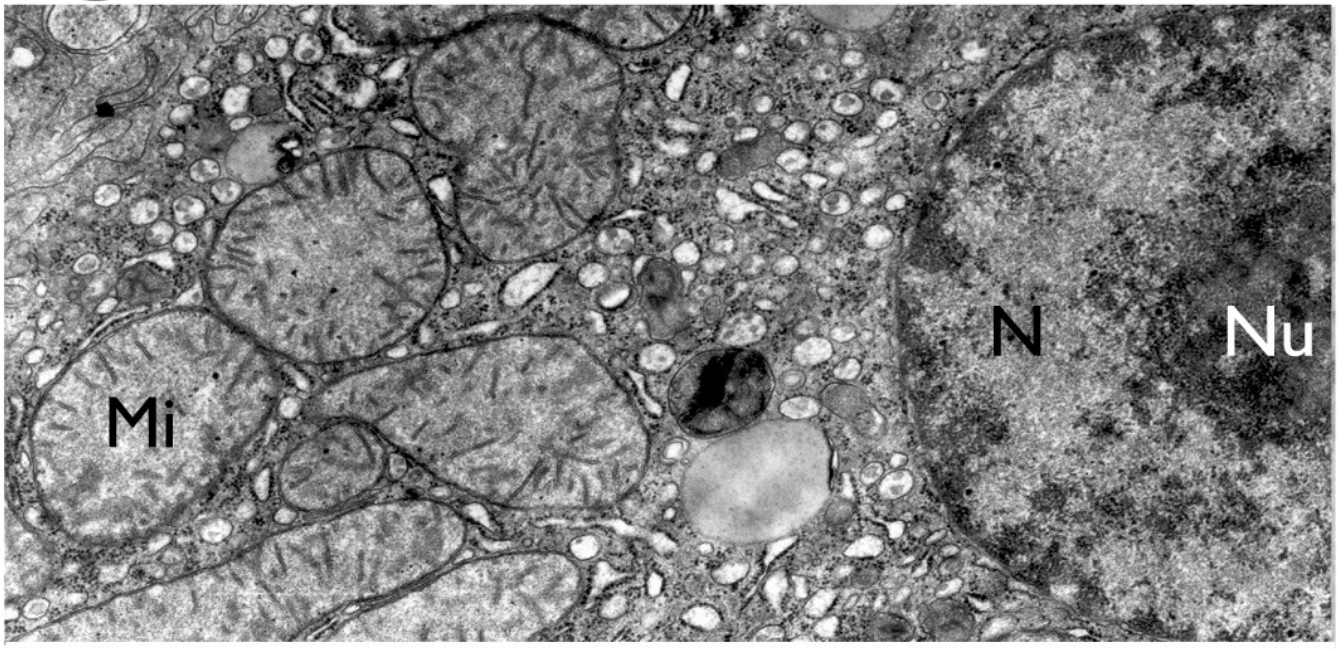




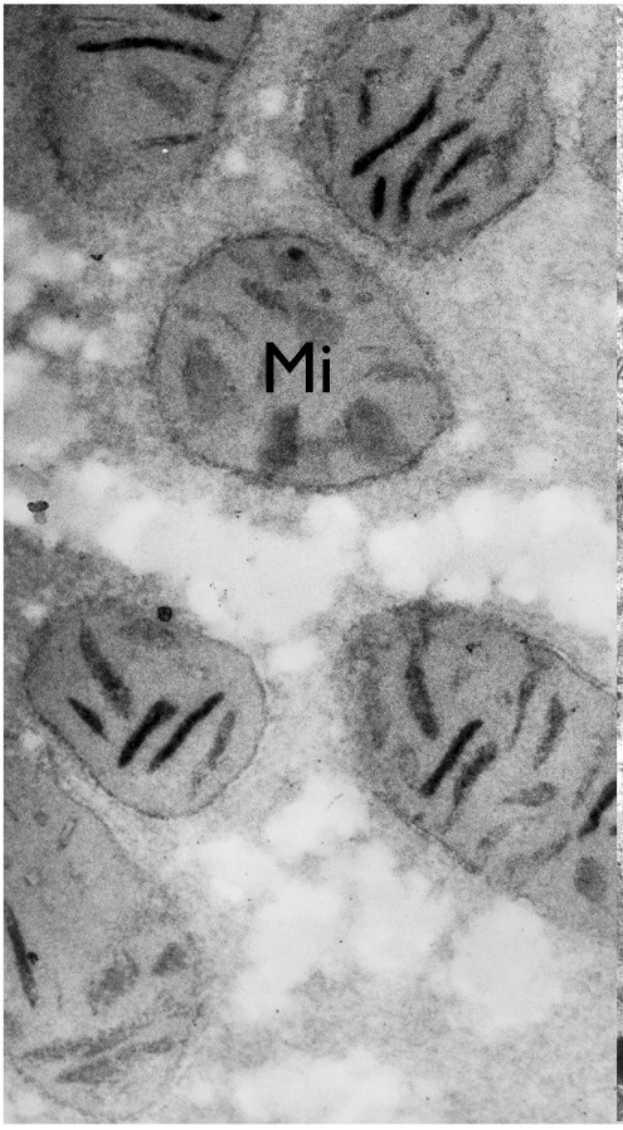
Mitocôndrias (Mi) e Grânulos de Glicogênio (setas)



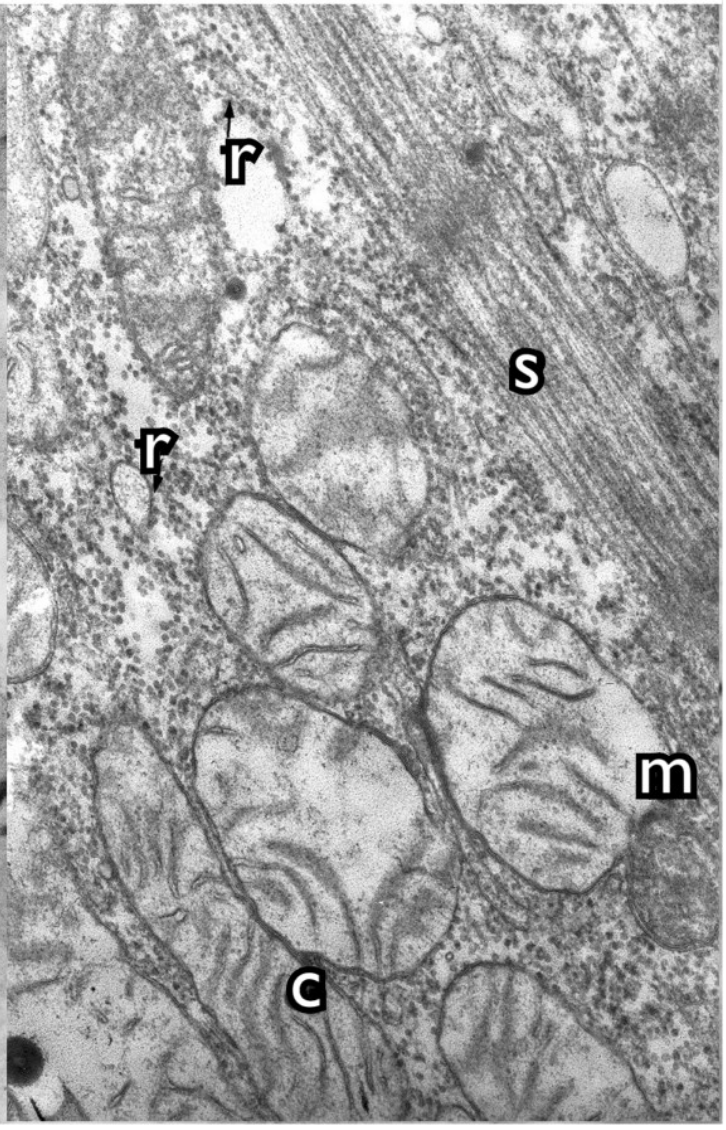
Produção de Energia - Mitocôndria



Hepatócito - Mitocôndrias - 35000X

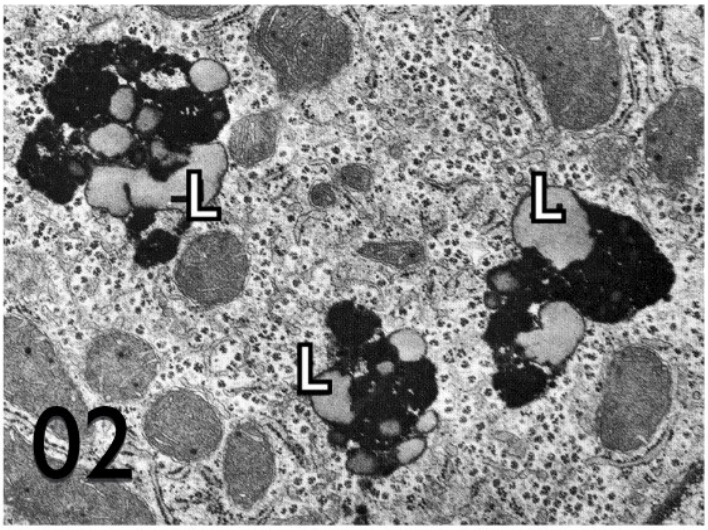


50000X



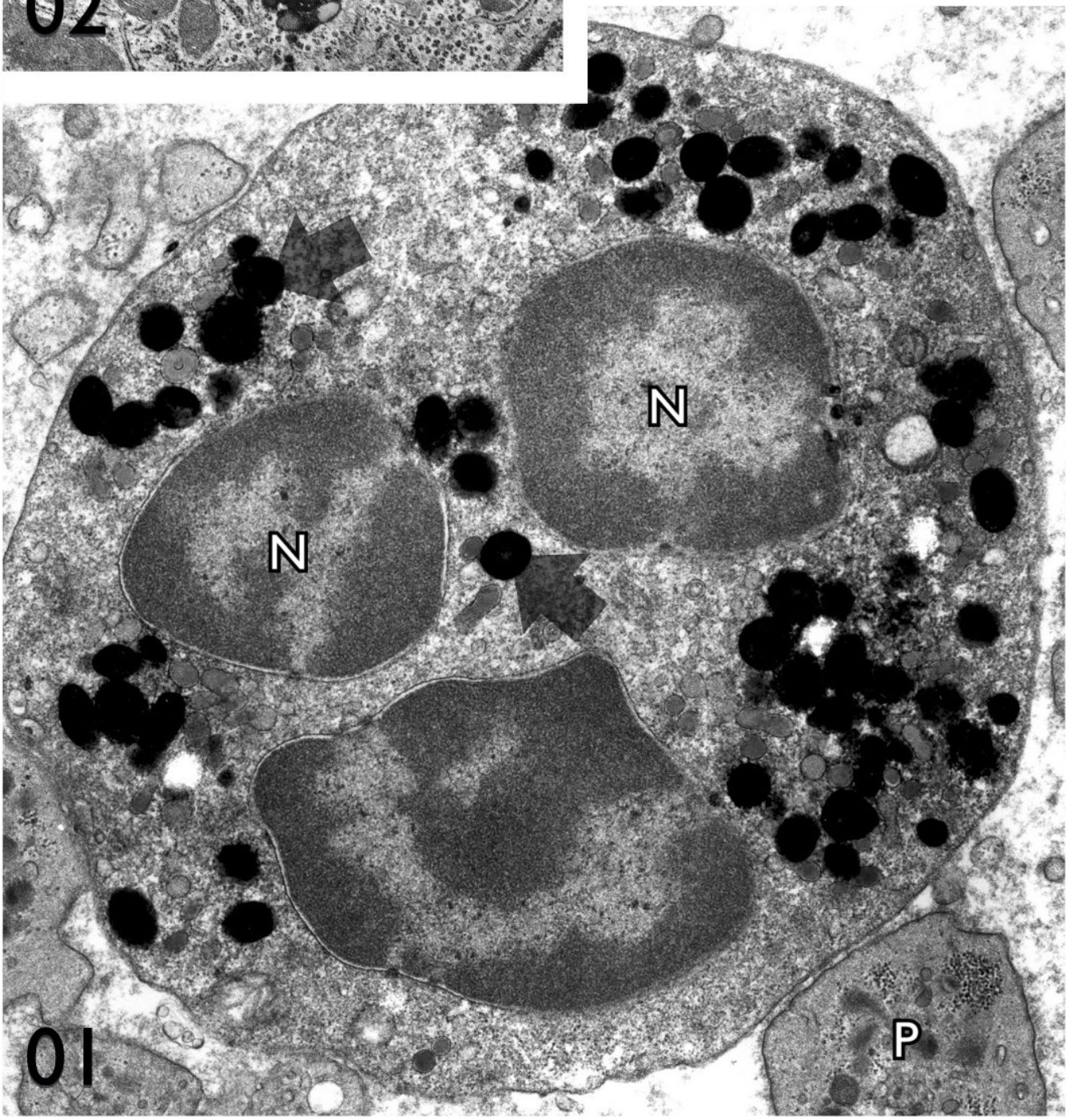
40000X

Digestão Intracelular - Lisossomos

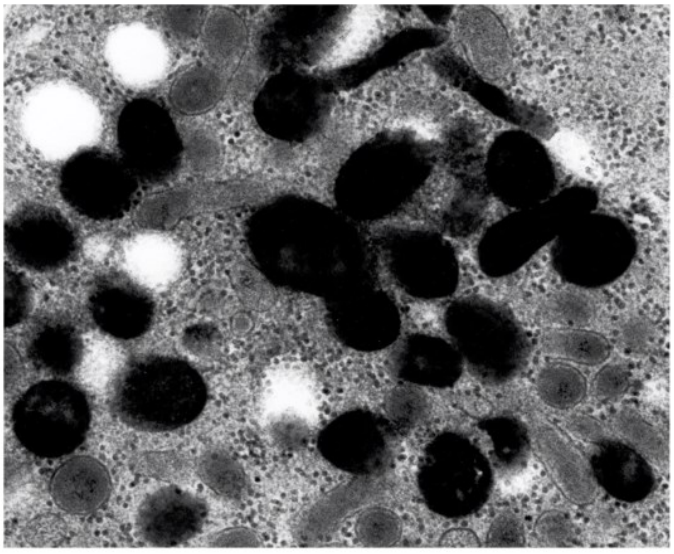


01 - Leucócito - Peroxidase - 20000X

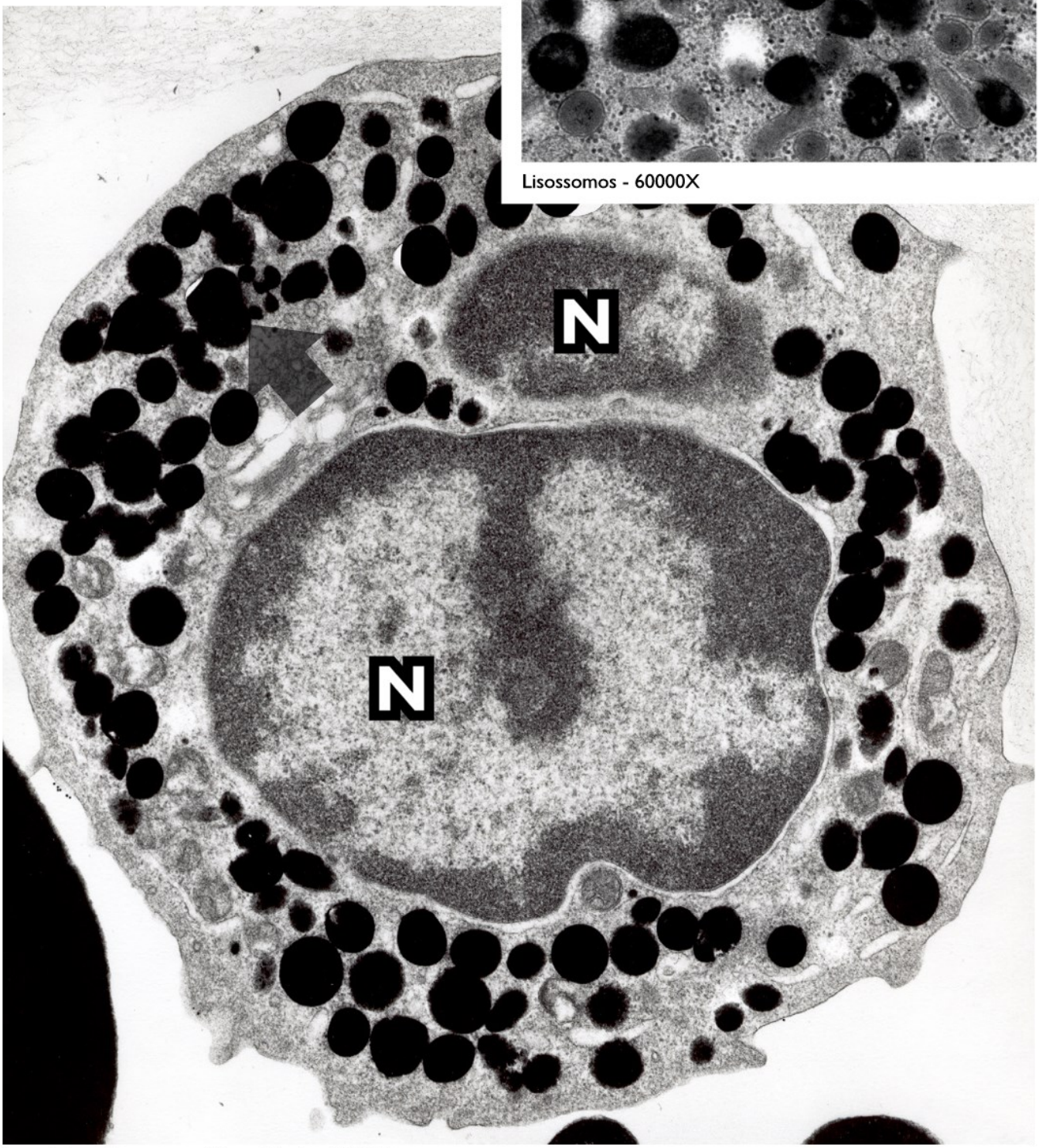
02 - Célula Hepática - Lisossomos - 16000X



Digestão Intracelular - Lisossomos

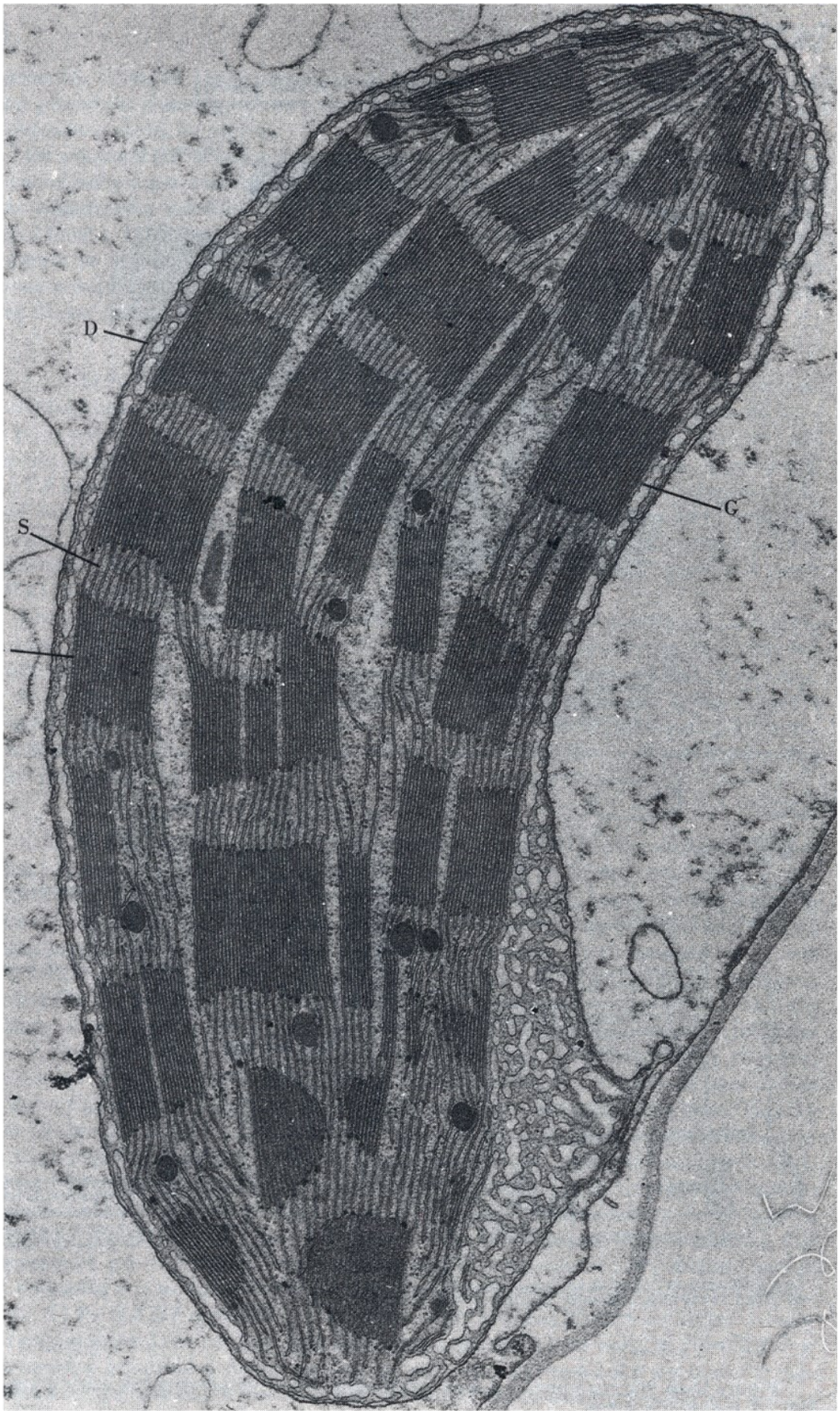


Lisossomos - 60000X



Leucócito - Lisossomos (Peroxidase) - 19000X

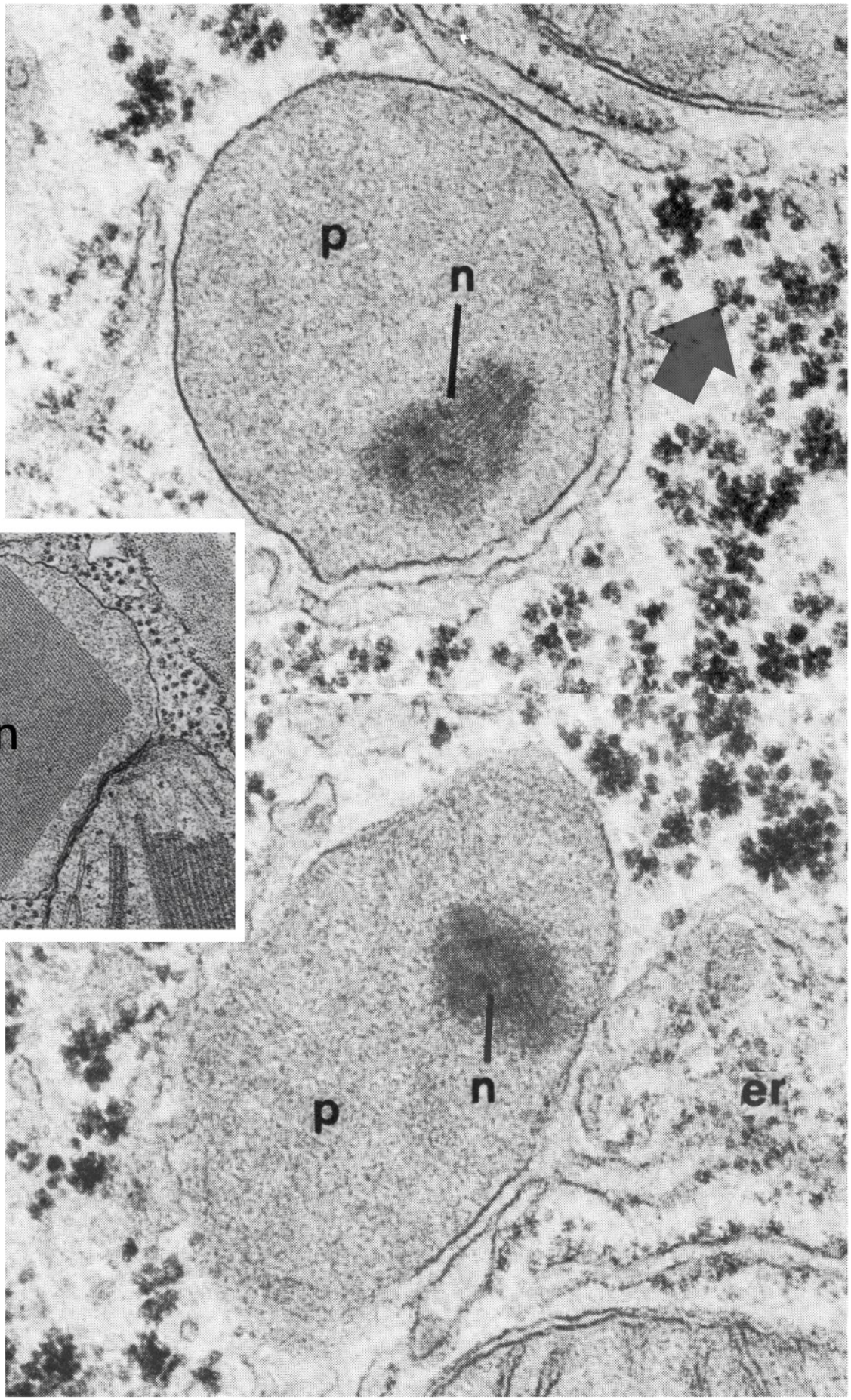
Produção de Energia - Cloroplasto



Cloroplasto - 75000X

Produção de Energia - Cloroplasto

Cloroplasto da folha do mamoeiro 60000X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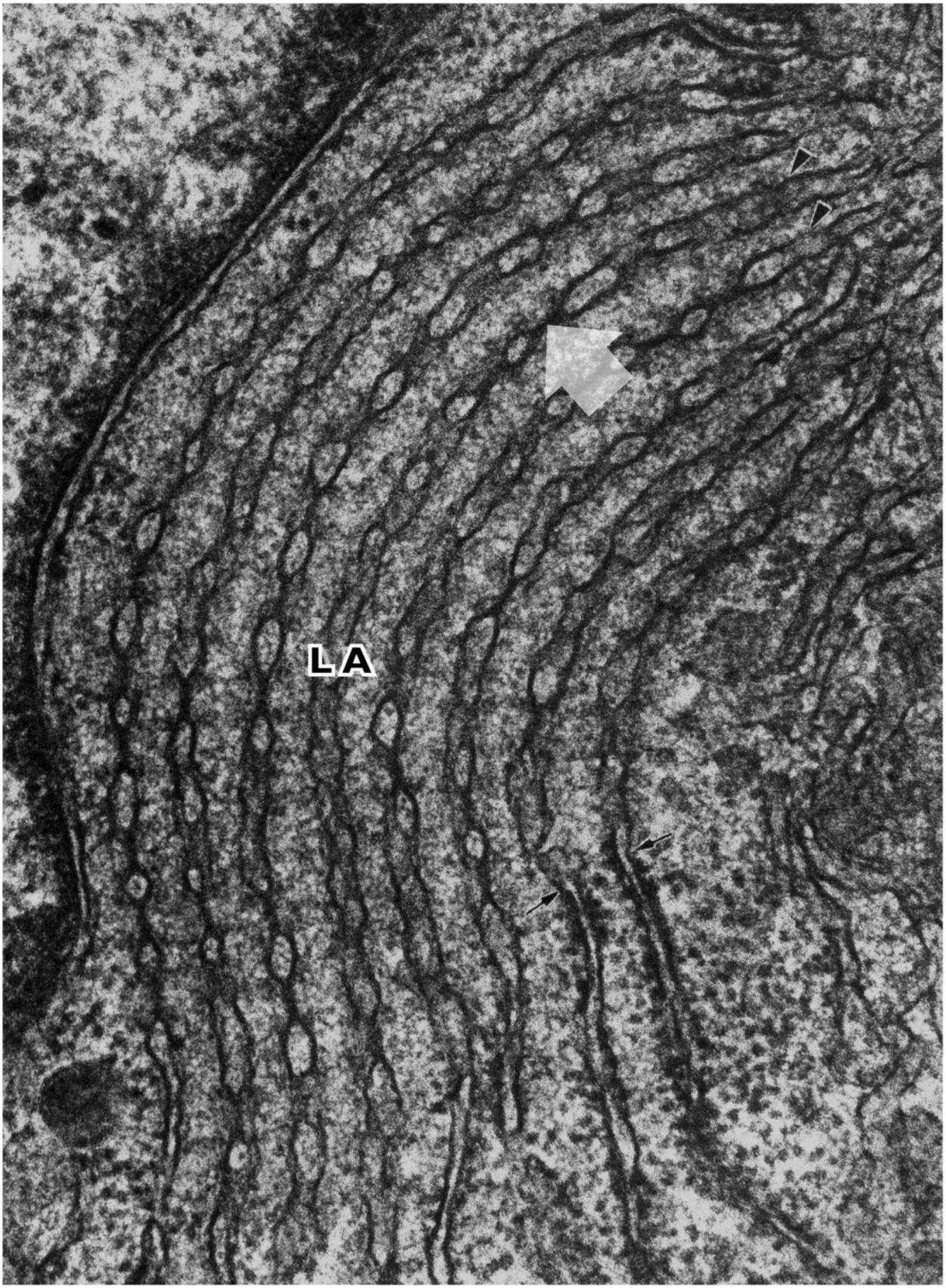
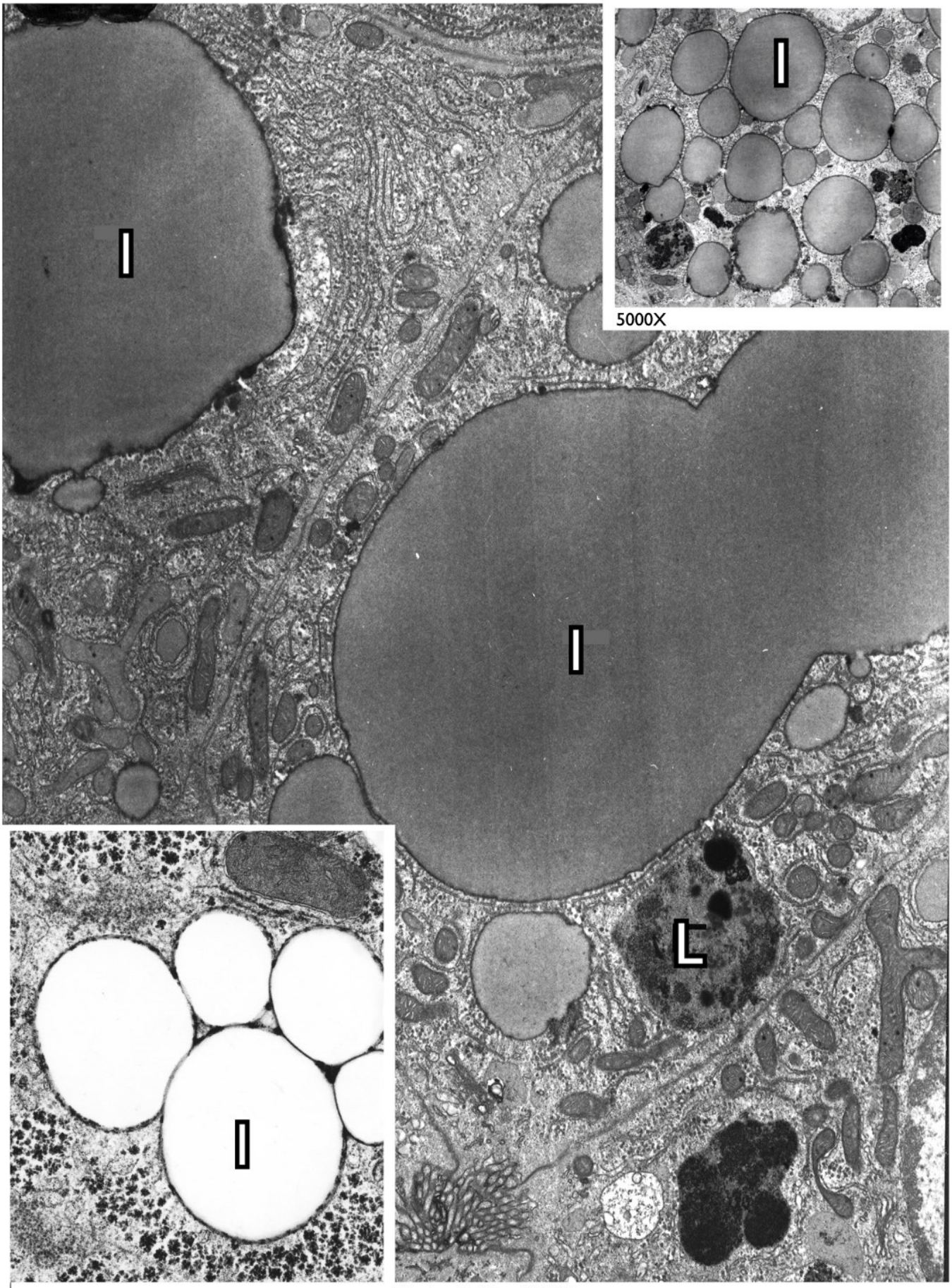


Lamelas Anulares

Inclusões Citoplasmáticas - Lipídios

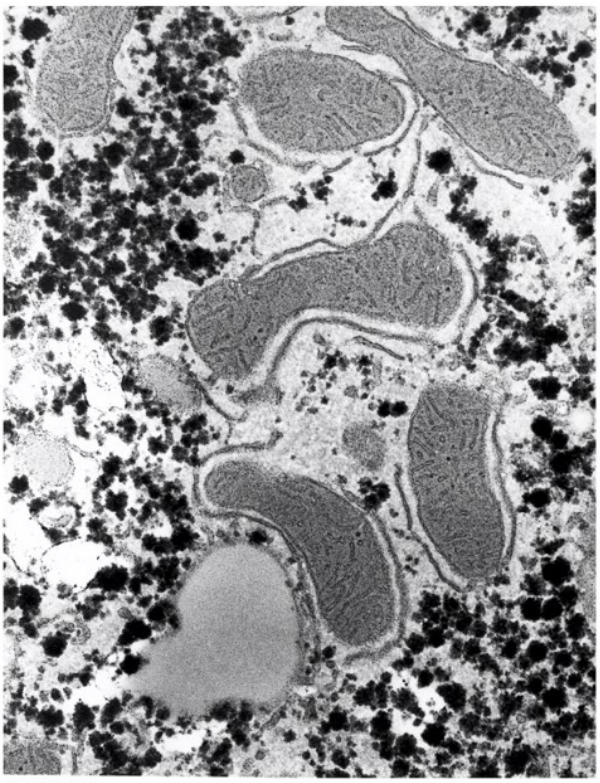


5000X

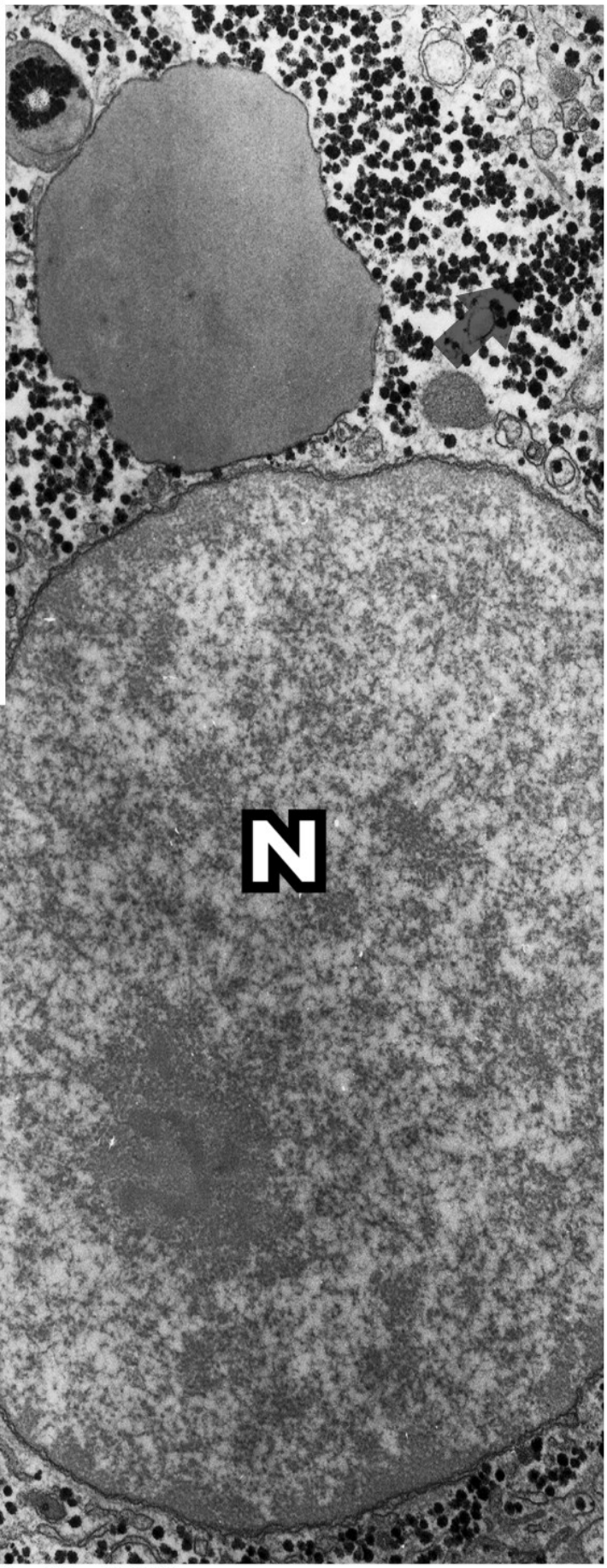
30000X

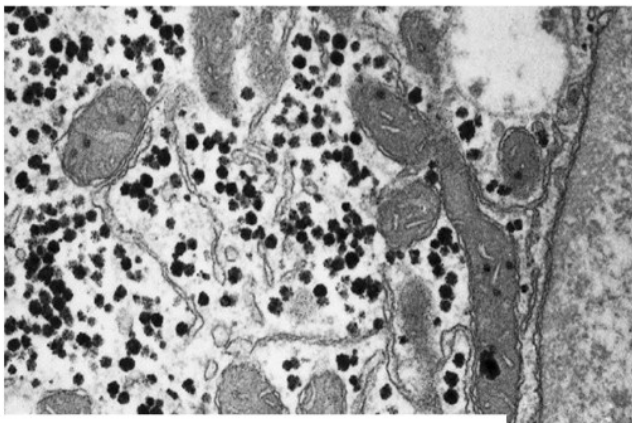
Fígado - Lipído - 5000X

Inclusões Citoplasmáticas - Glicogênio



60000X

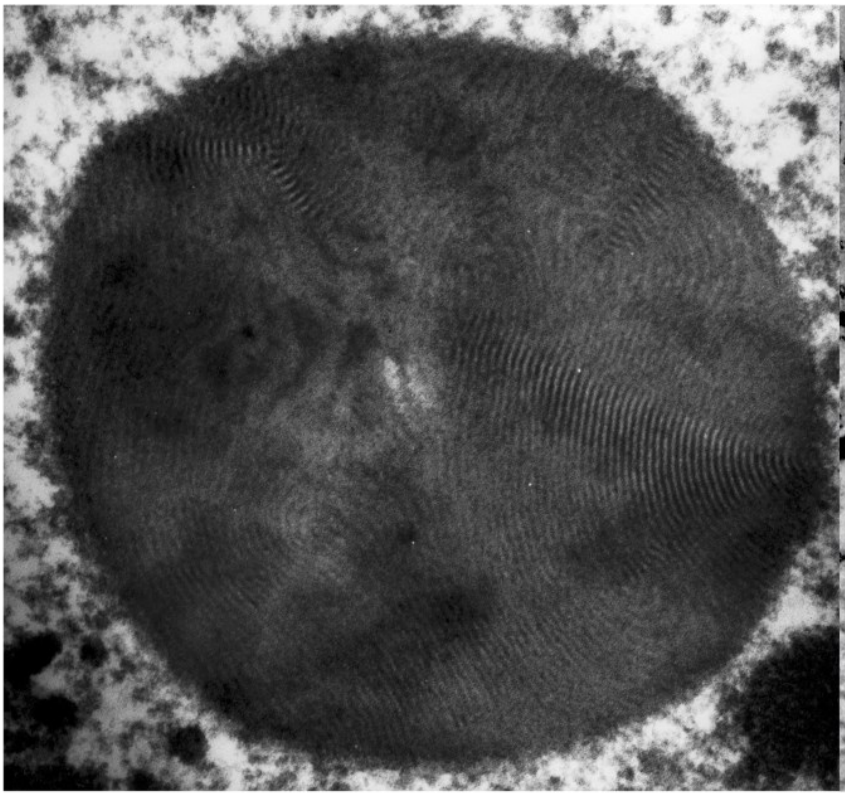




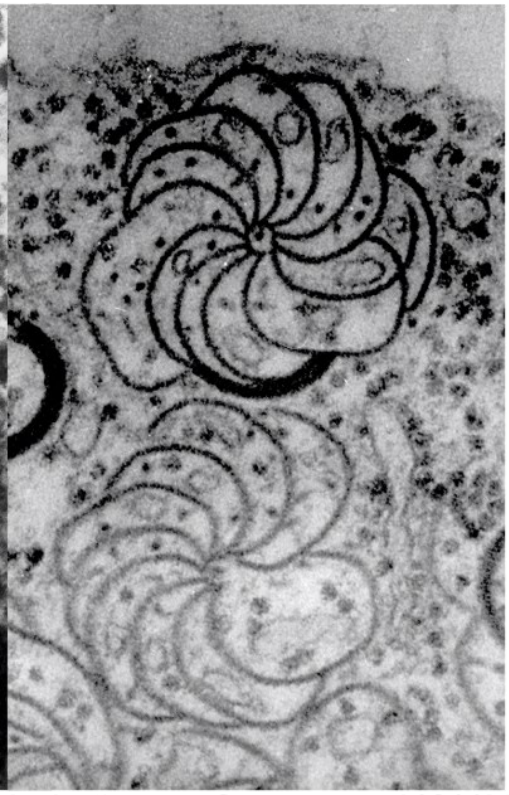
MO - 430X

Fígado - Glicogênio - 36400X

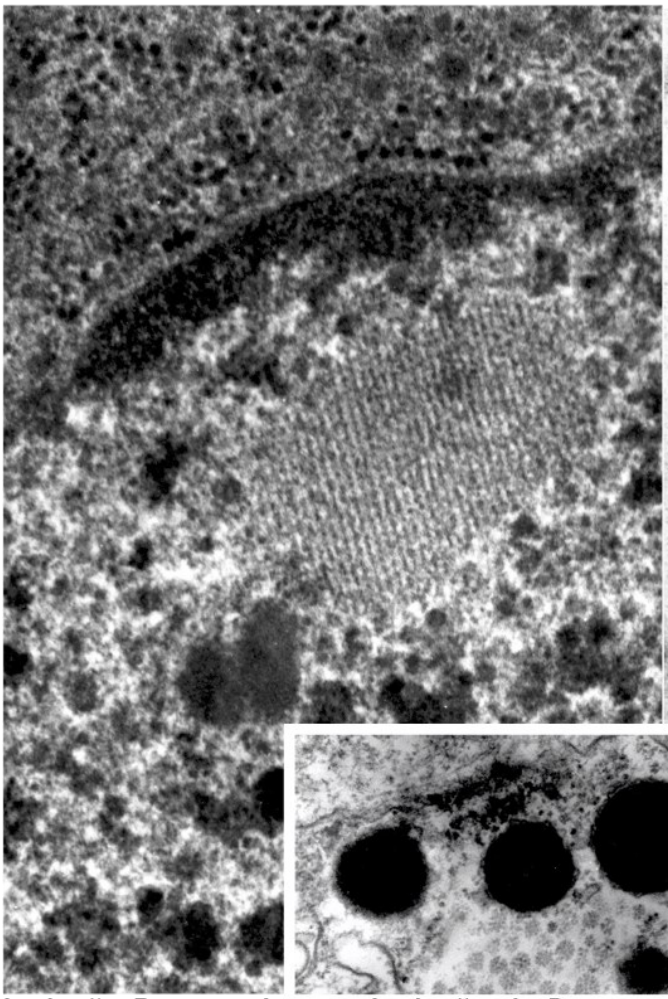
Inclusões Citoplasmáticas



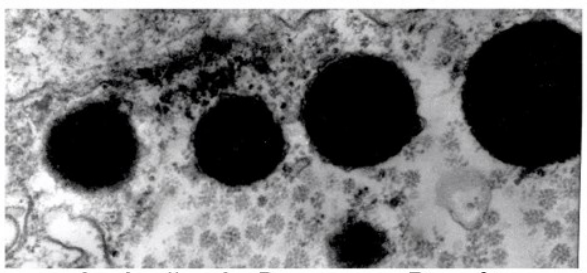
Inclusão Cristalina tipo "Poupa Digital" - 30000X



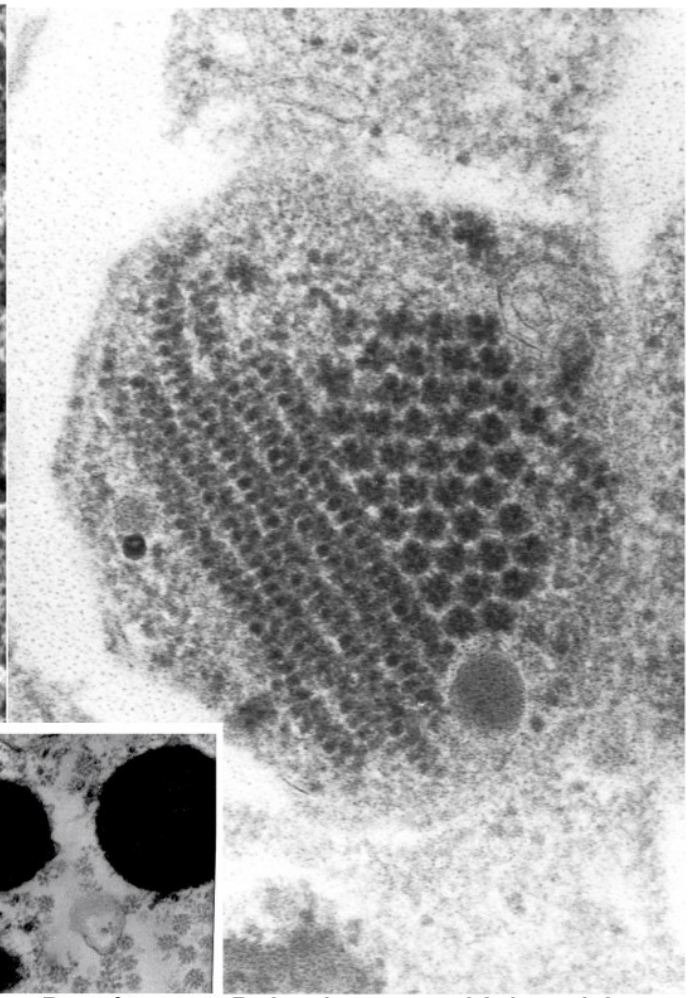
Inclusão tipo Catavento - 10300X



Inclusão Pararistalina

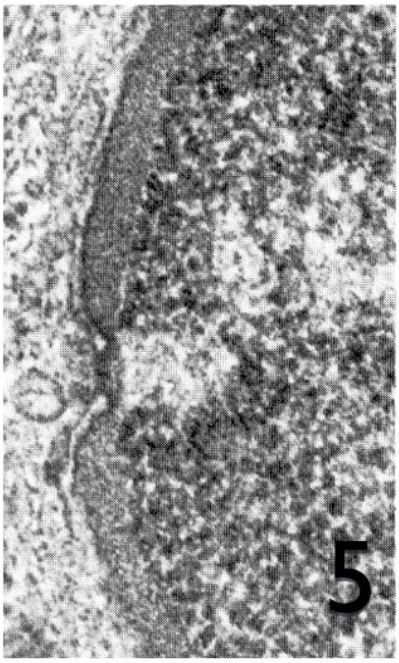


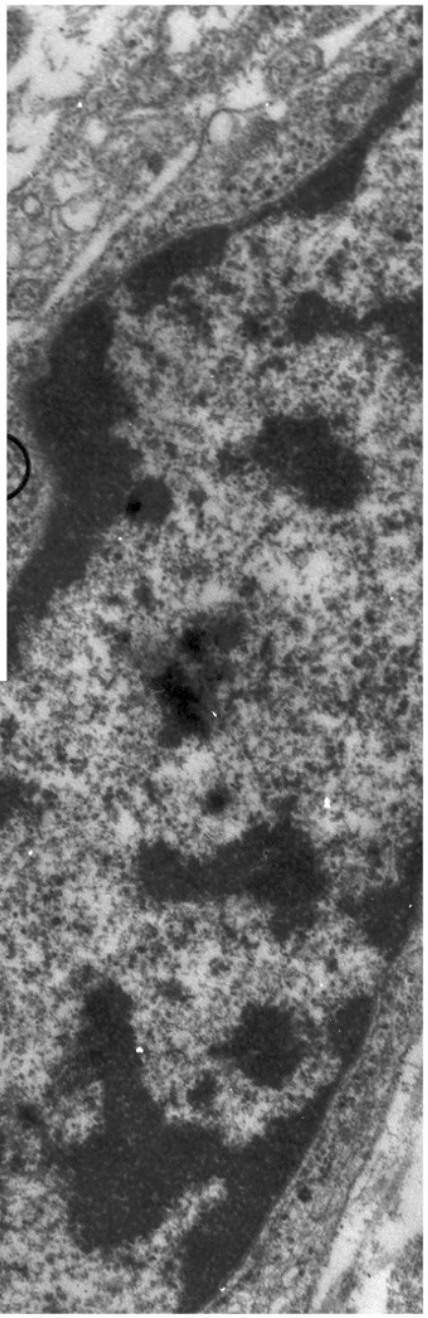
Inclusão de Reserva - Protéica

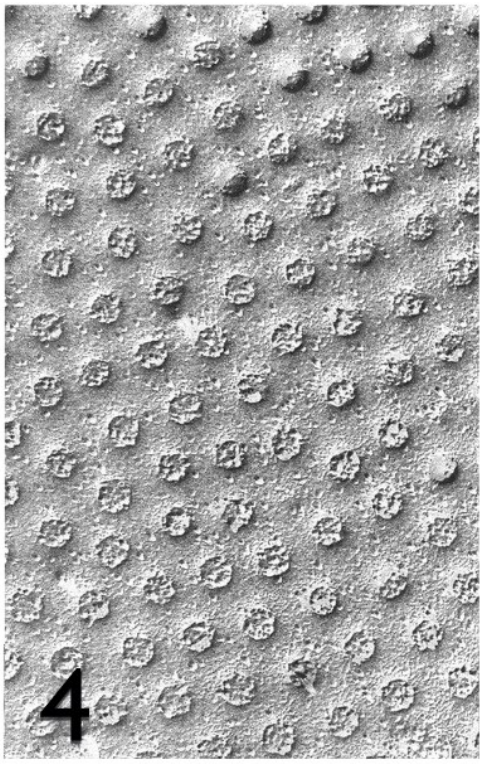


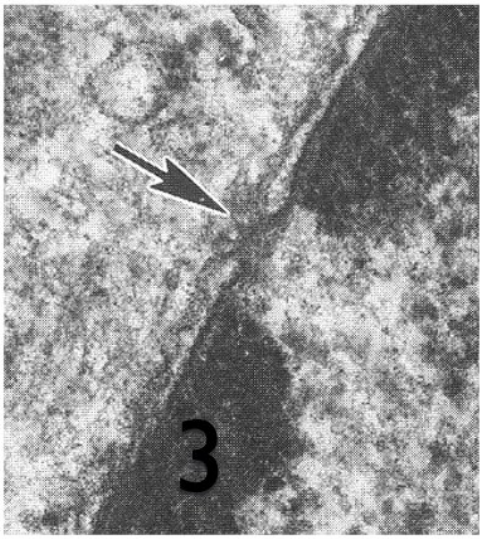
Polirribossoma Helicoidal

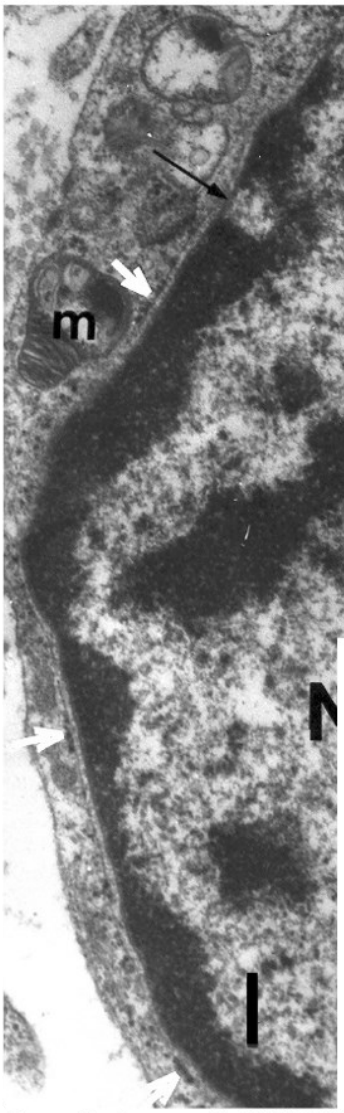
Núcleo Interfásico

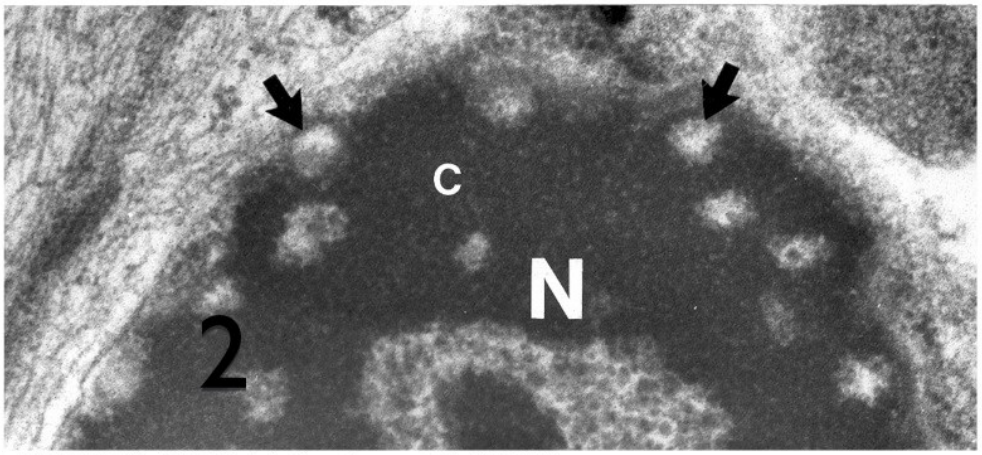




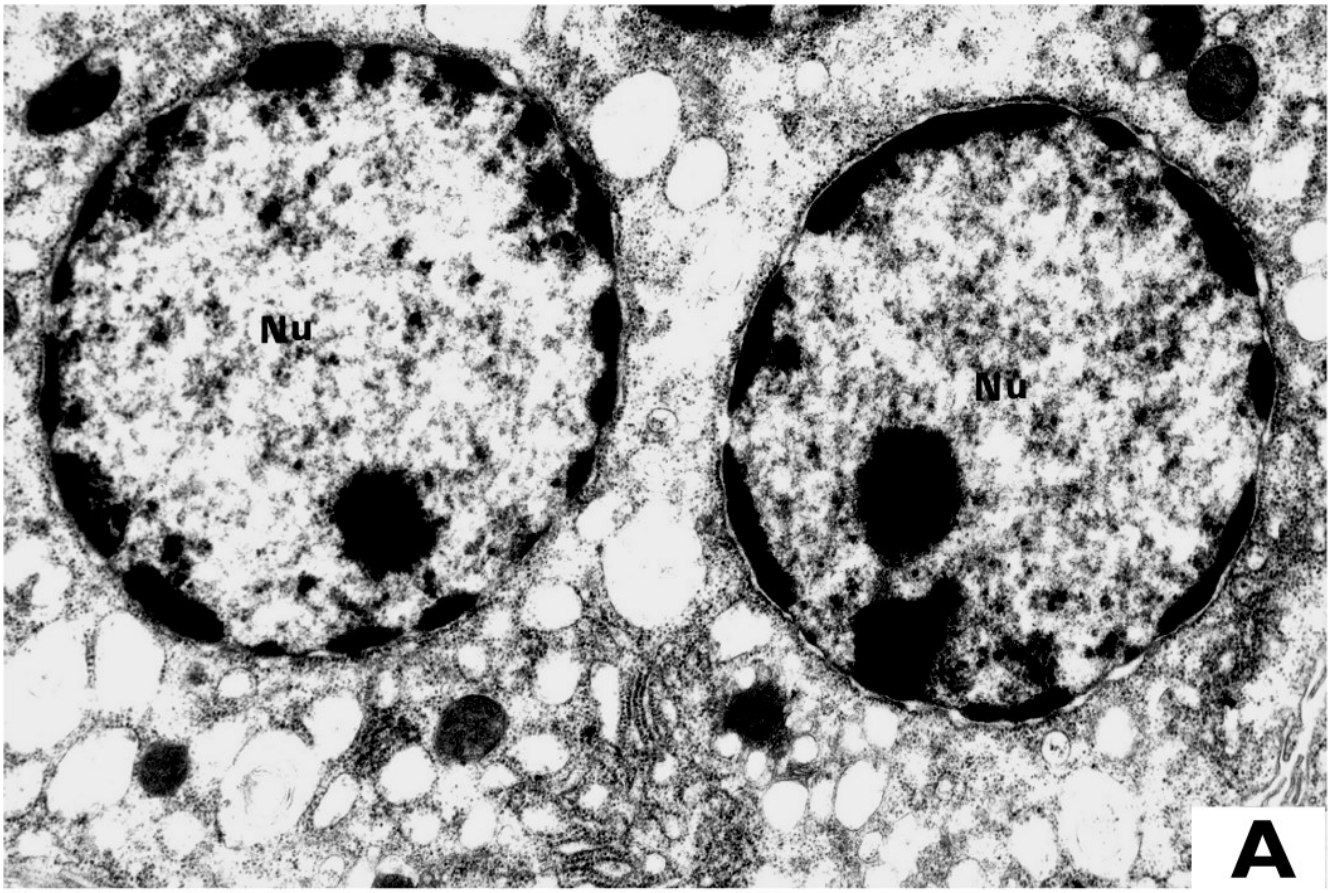




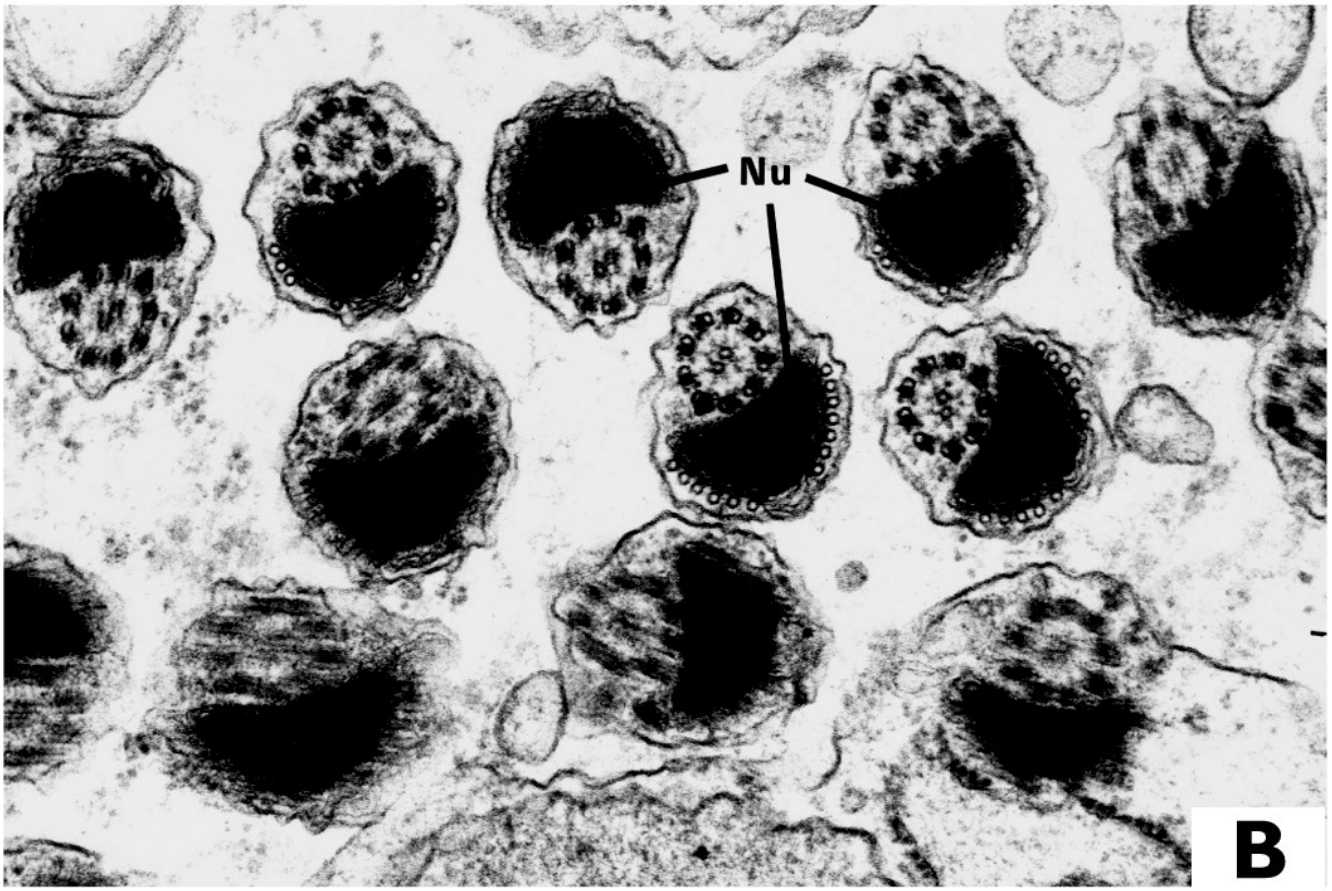




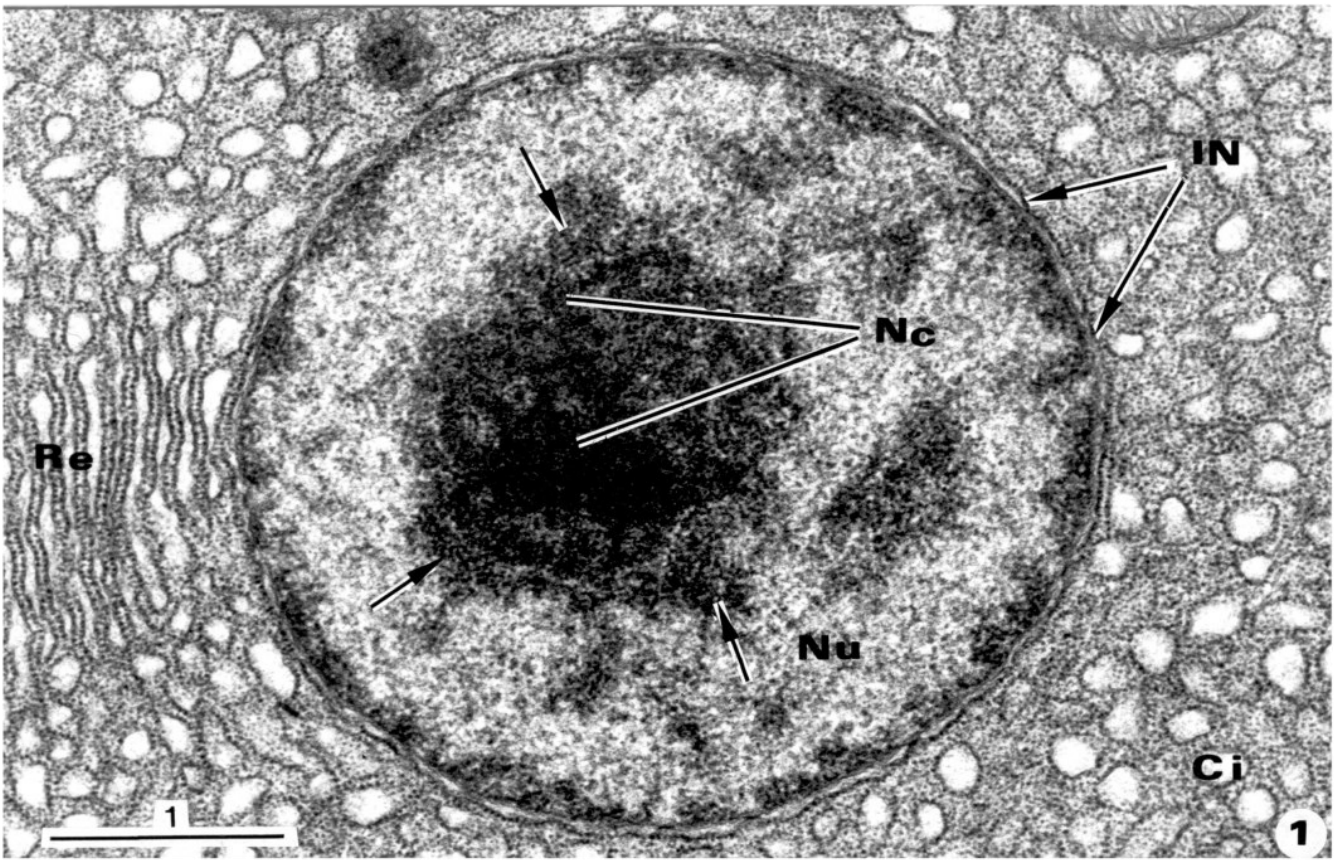
Poros Nucleares - 1) 15000X / 2) 35000X / 3) 60000X / 4) Crio fratura / 5) 60000X



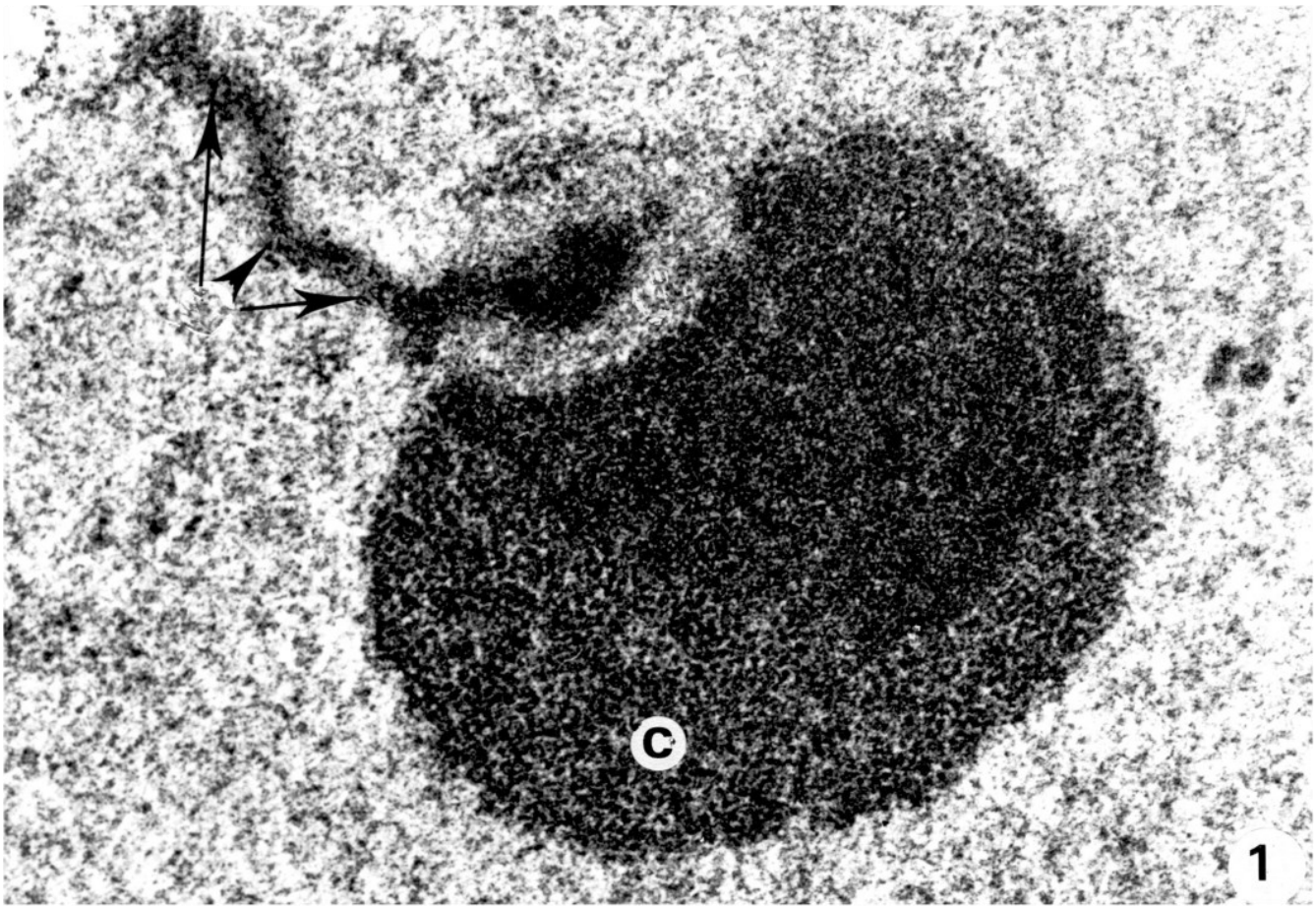
Hepatócito embrionário binucleado de rato com seus dois núcleos (Nu).



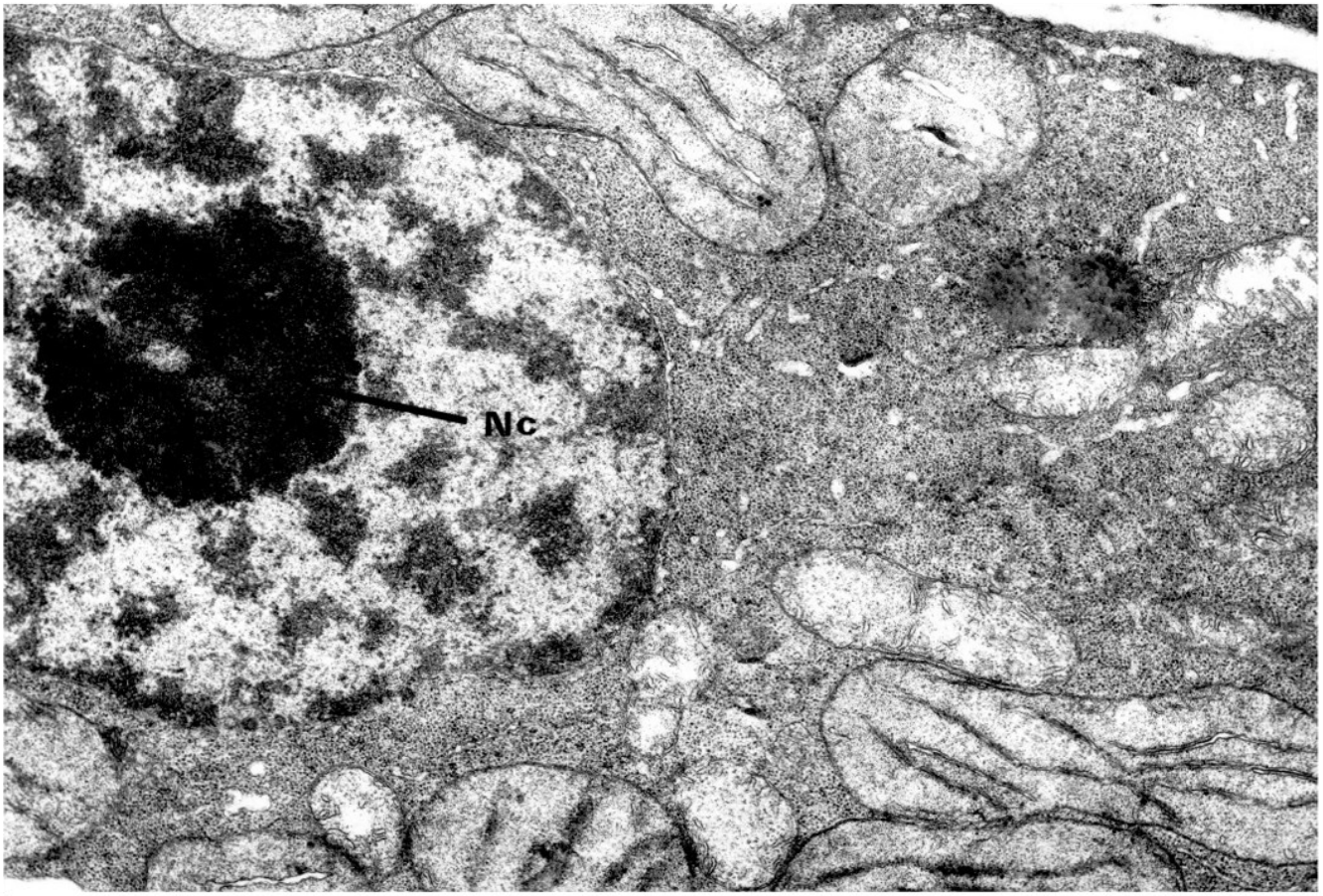
Núcleos (Nu) de Espermátide em fase avançada de espermiogênese.

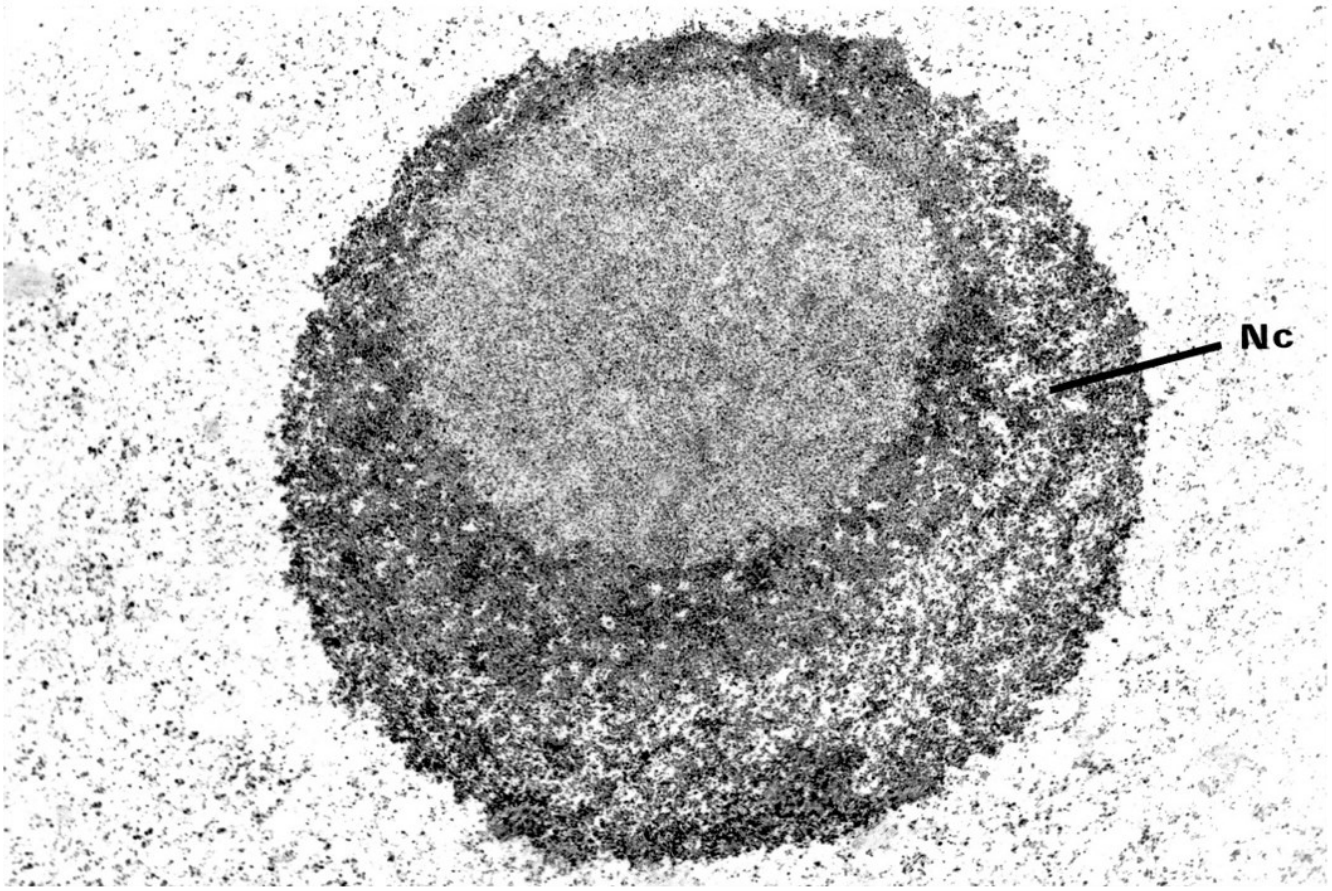


Hepatócito embrionário de rato. Envoltório nuclear (IM). Nucléolo (Nc). Cromatina associada ao nucléolo (setas)

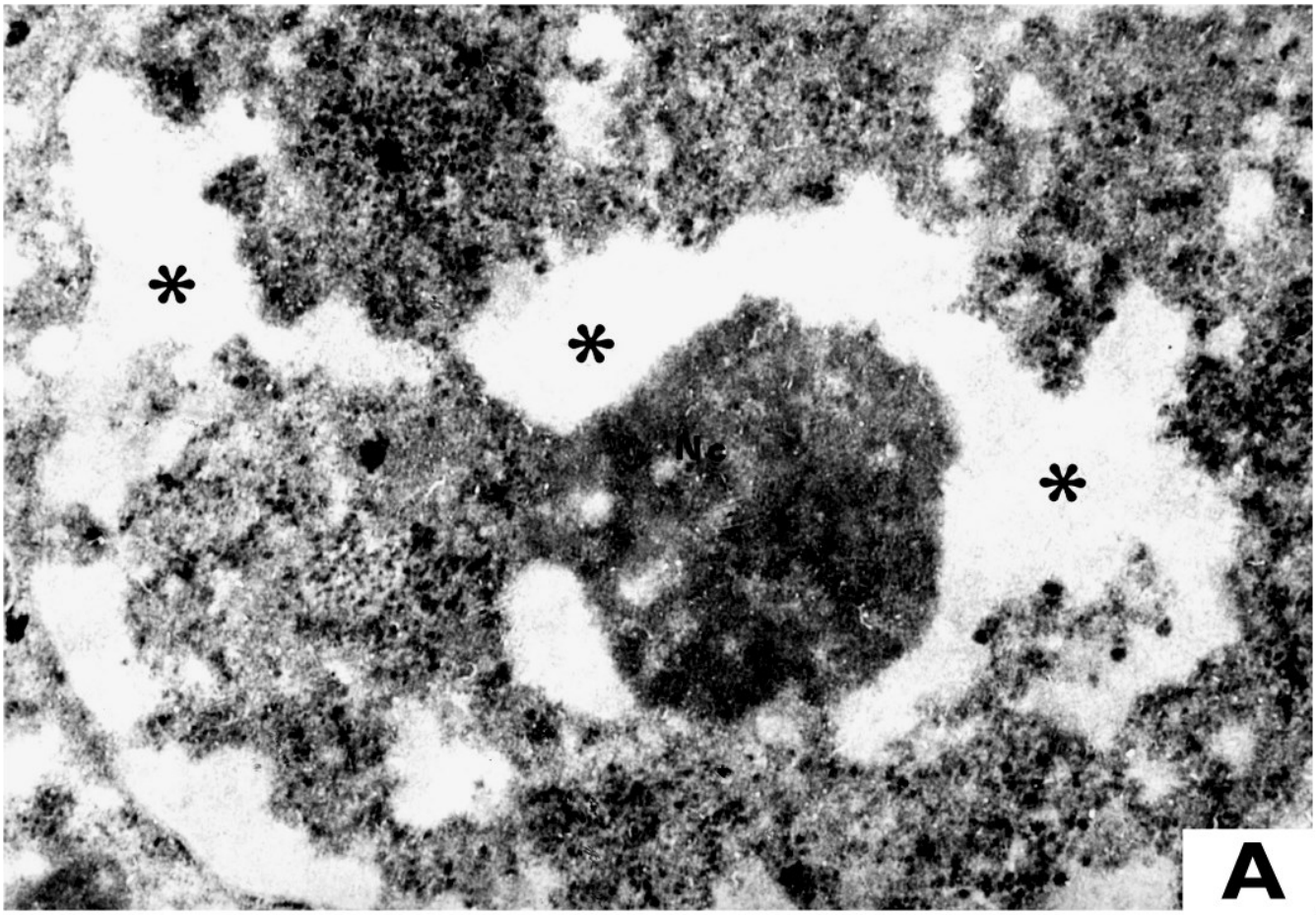


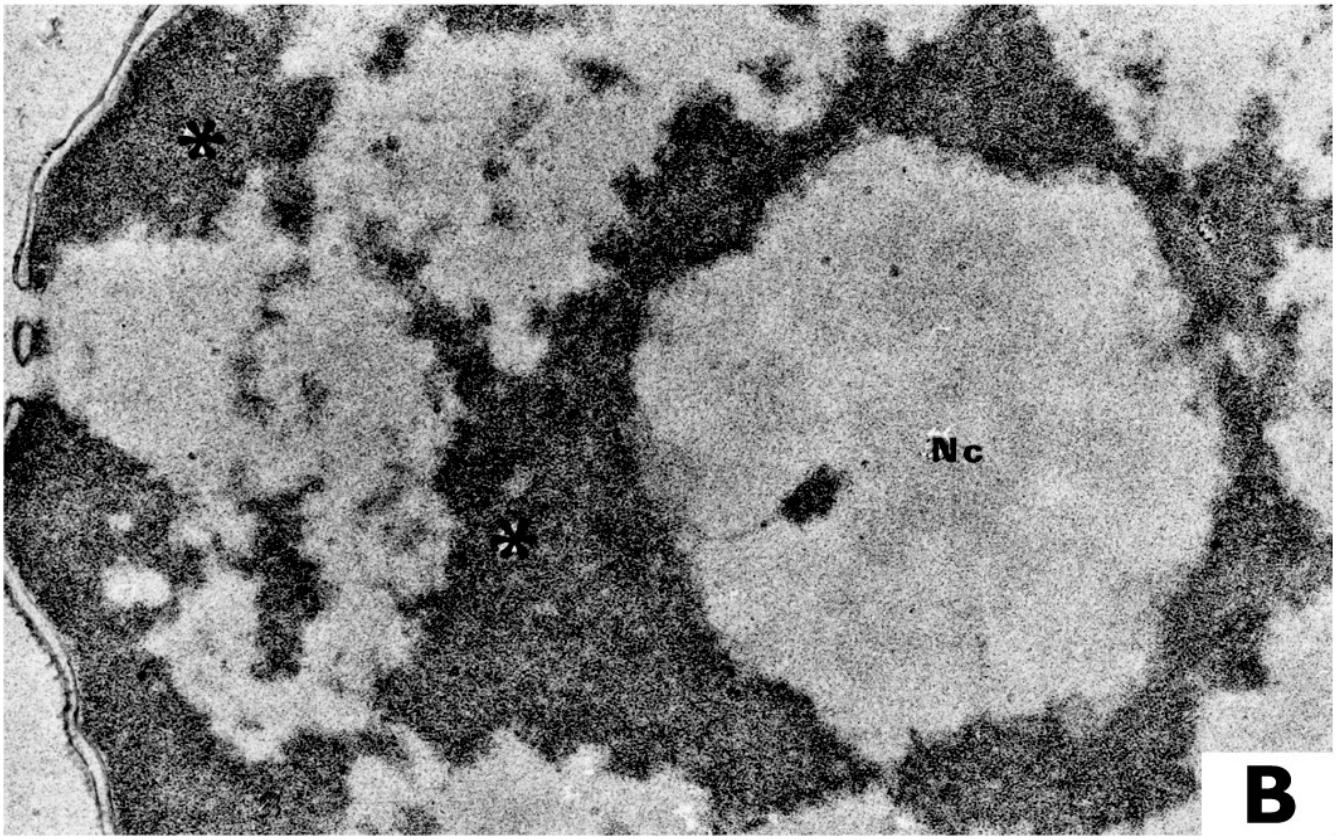
Nucléolo do Parasita (Perkinsus atlanticus) mostrando o cromossomo nucleolar (setas) centro fibrilar e granular (c)





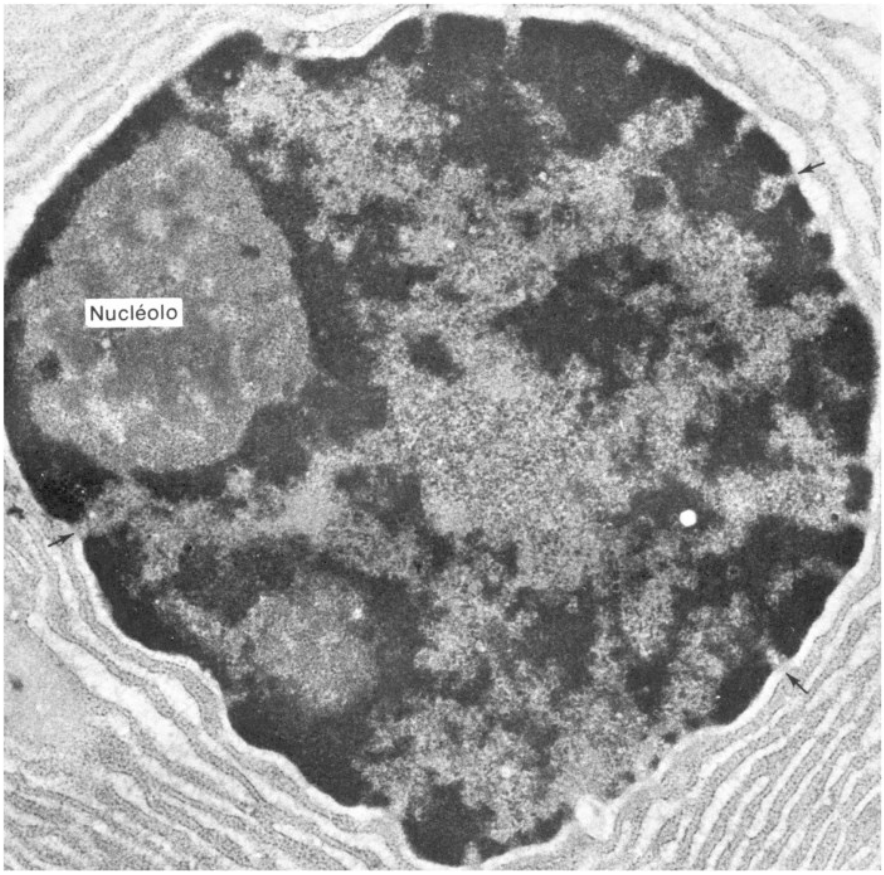
Dois aspectos de nucléolos (Nc). Célula vegetal (superior) e ovócito (inferior)



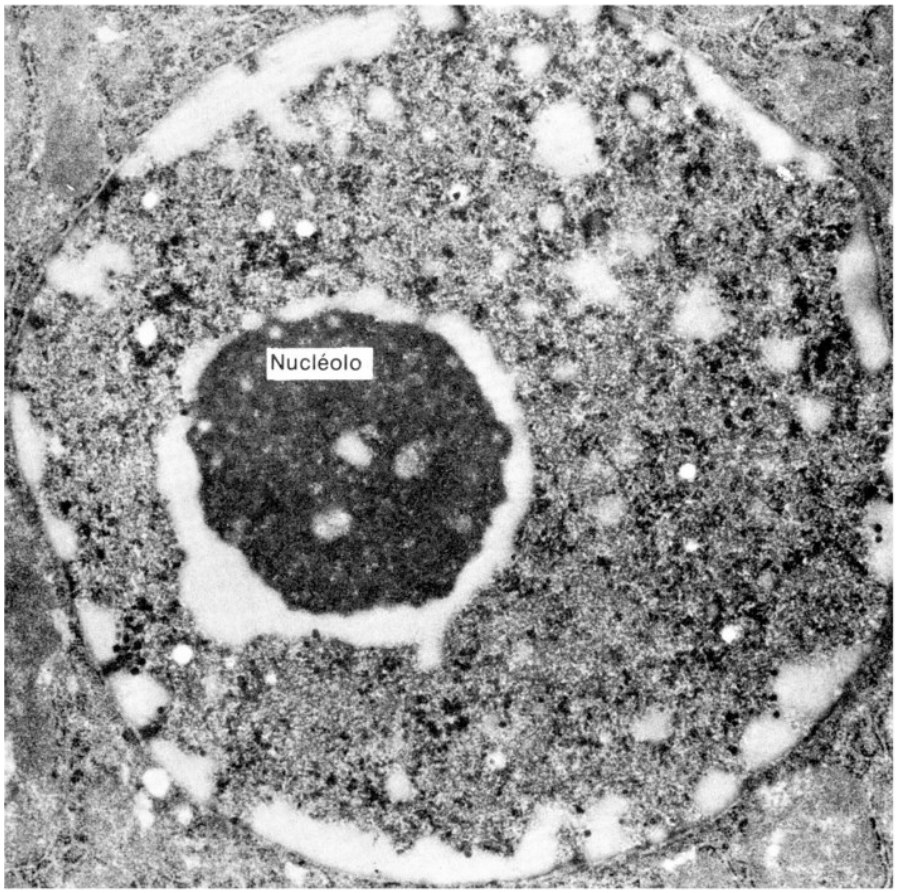


Hepatócitos preparados pela tecnica do EDTA (A) e pela técnica da Amina de Ósmio (B). Cromatina = (*). Nucléolo (Nc). 60000X

Núcleo Interfásico

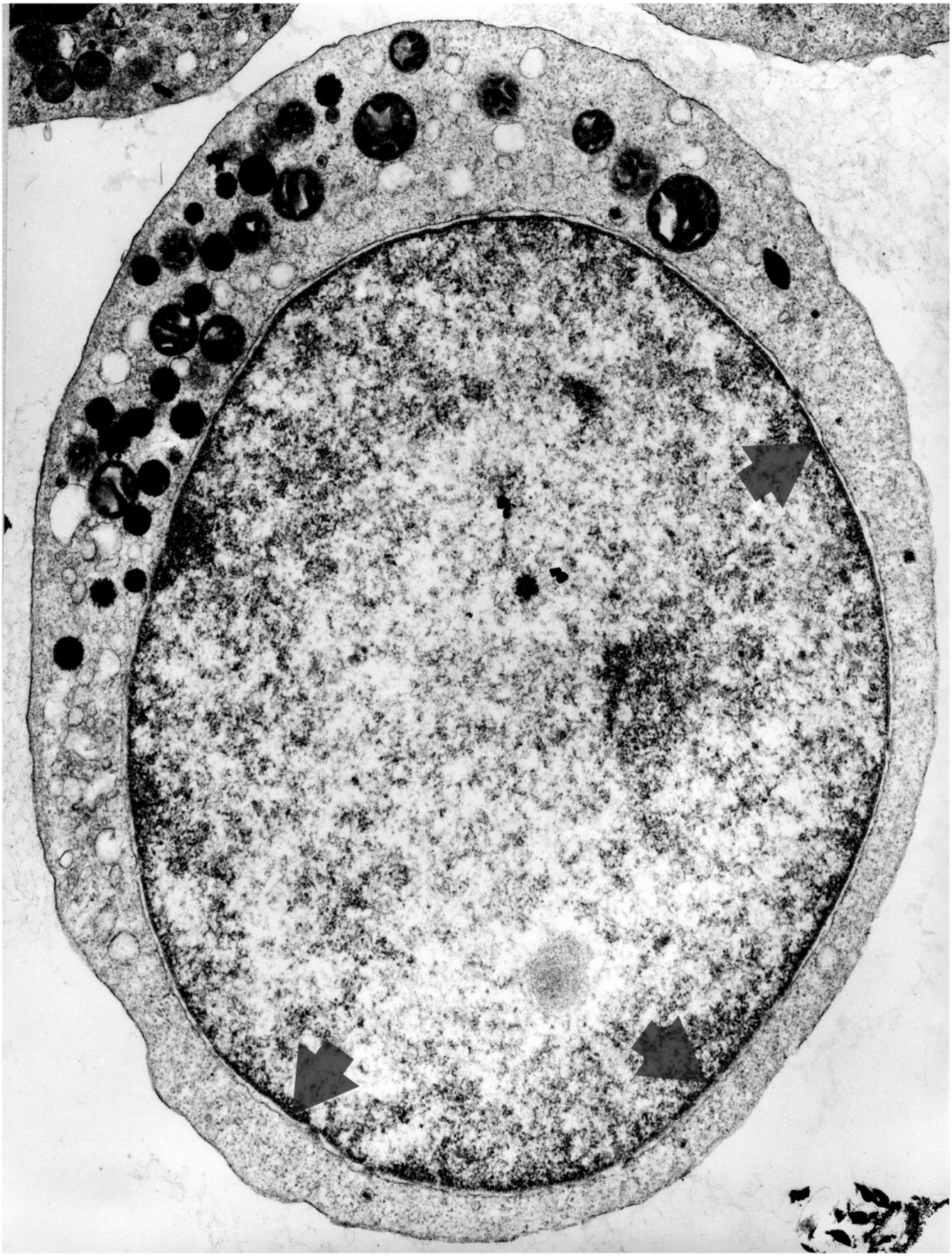


Célula acinosa do pâncreas tratada pela enzima RNAase para coloração do DNA



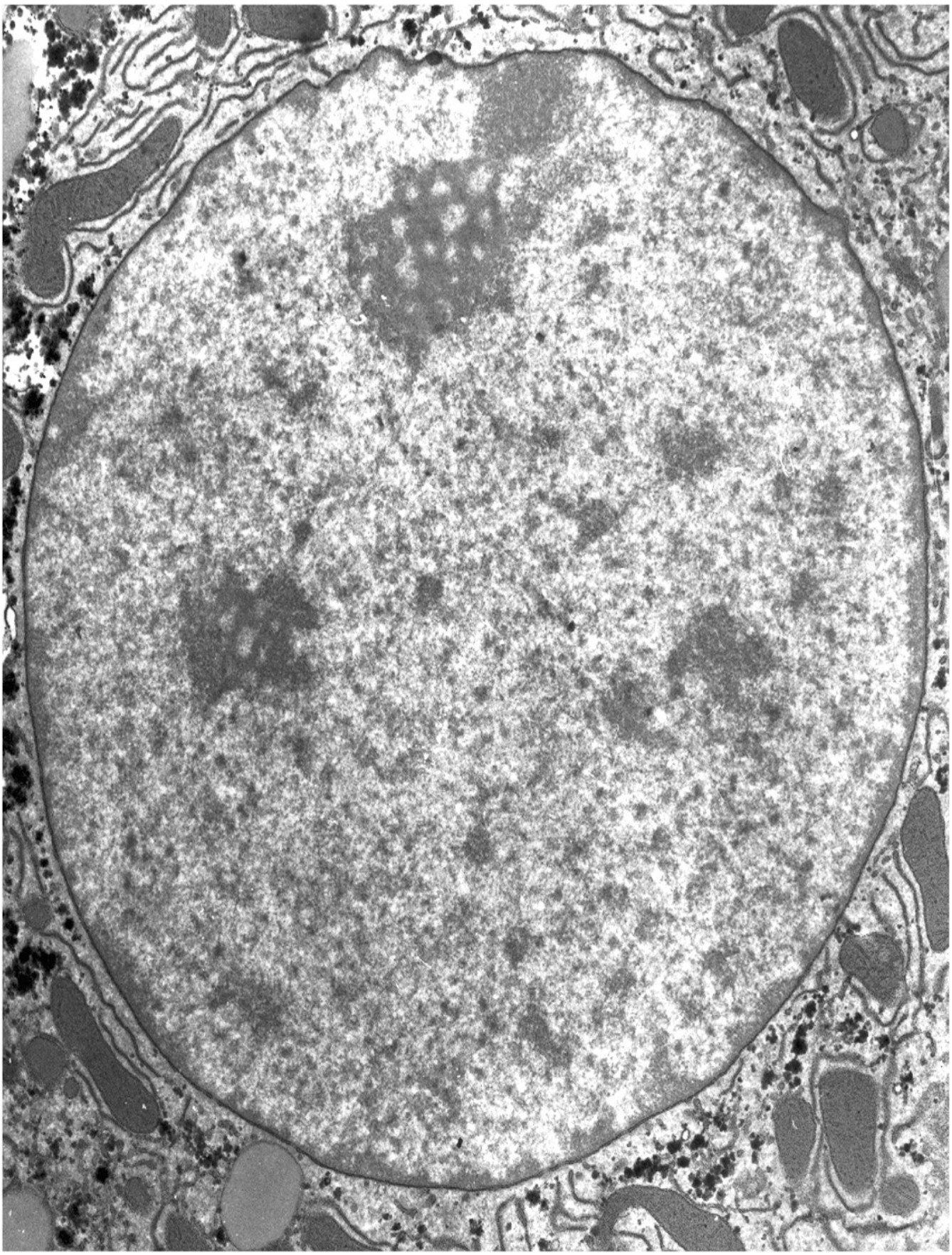
Hepatócito tratado pela enzima DNAase para coloração do RNA

Núcleo Interfásico



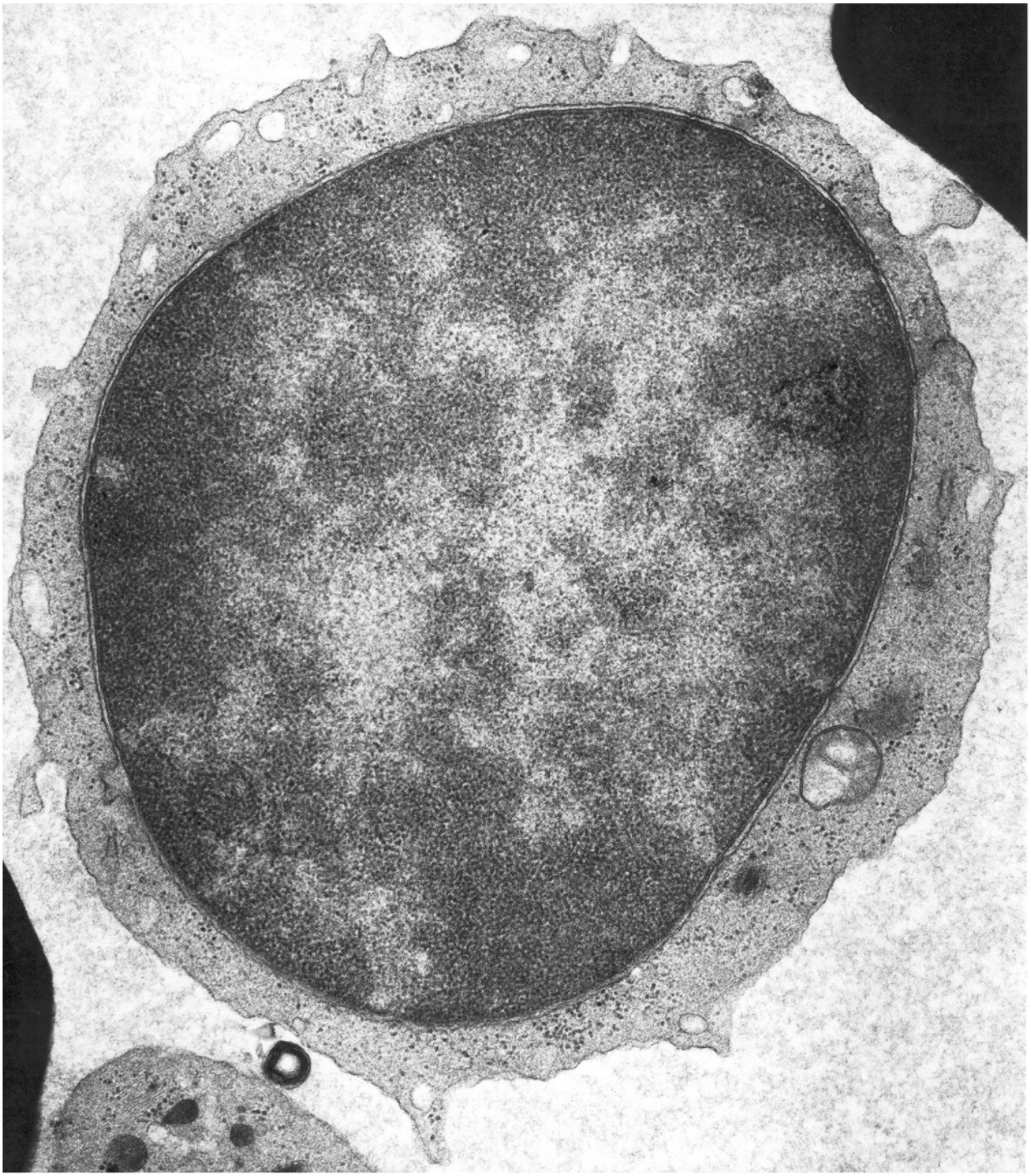
Leucócito - Lâmina Nuclear - 20000X

Núcleo Interfásico



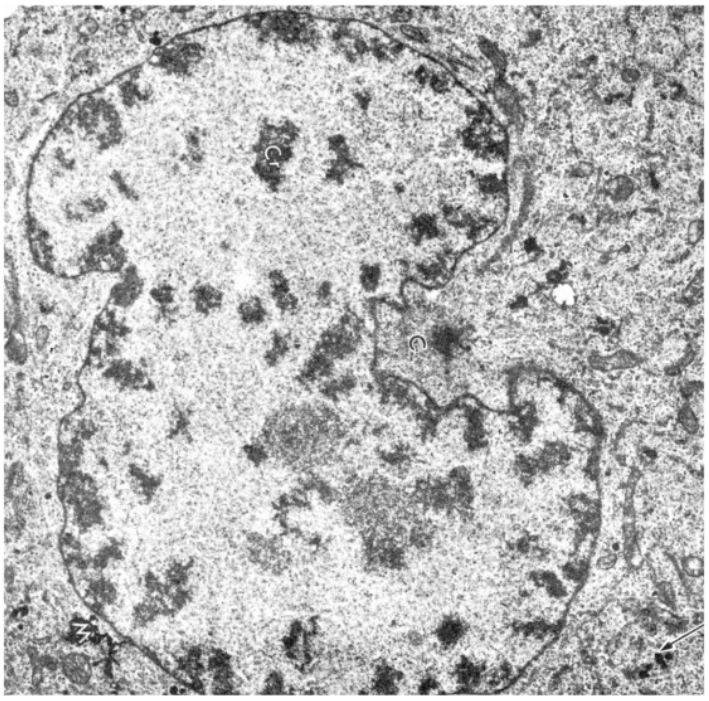
Célula hepática - 16000X

Núcleo Interfásico

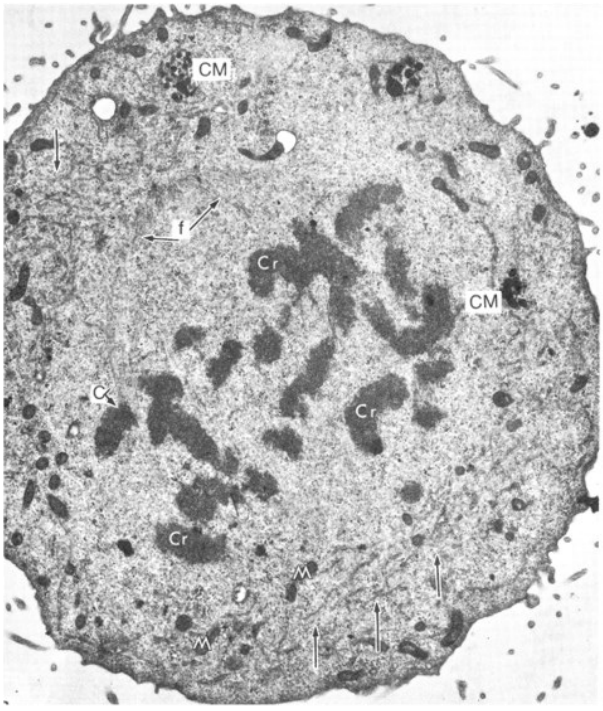


Leucócito - Heterocromatina - 20000X

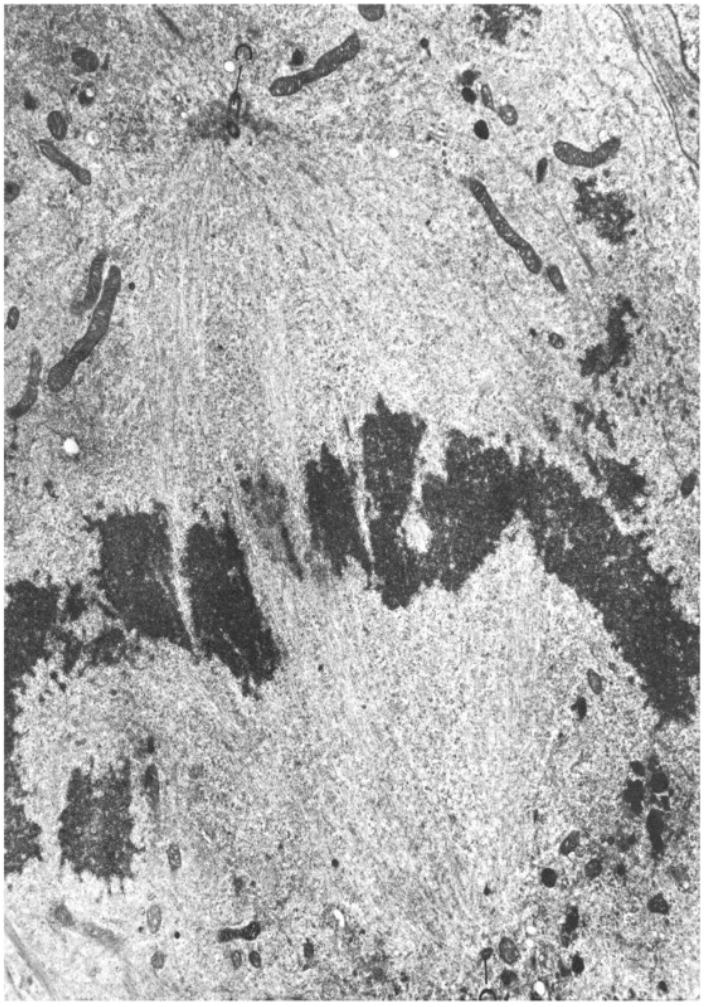
Divisão Celular - Mitose



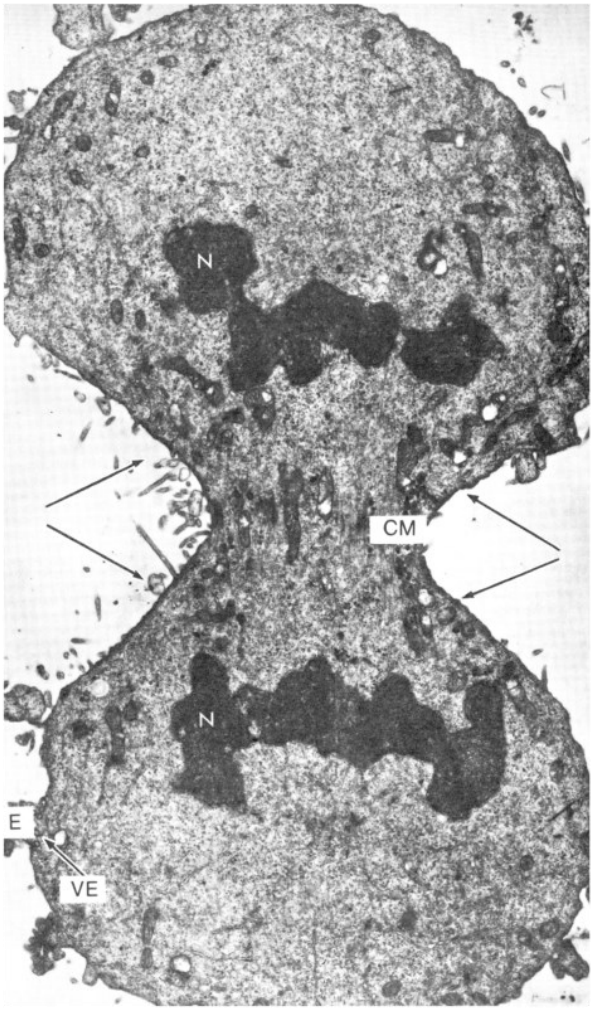
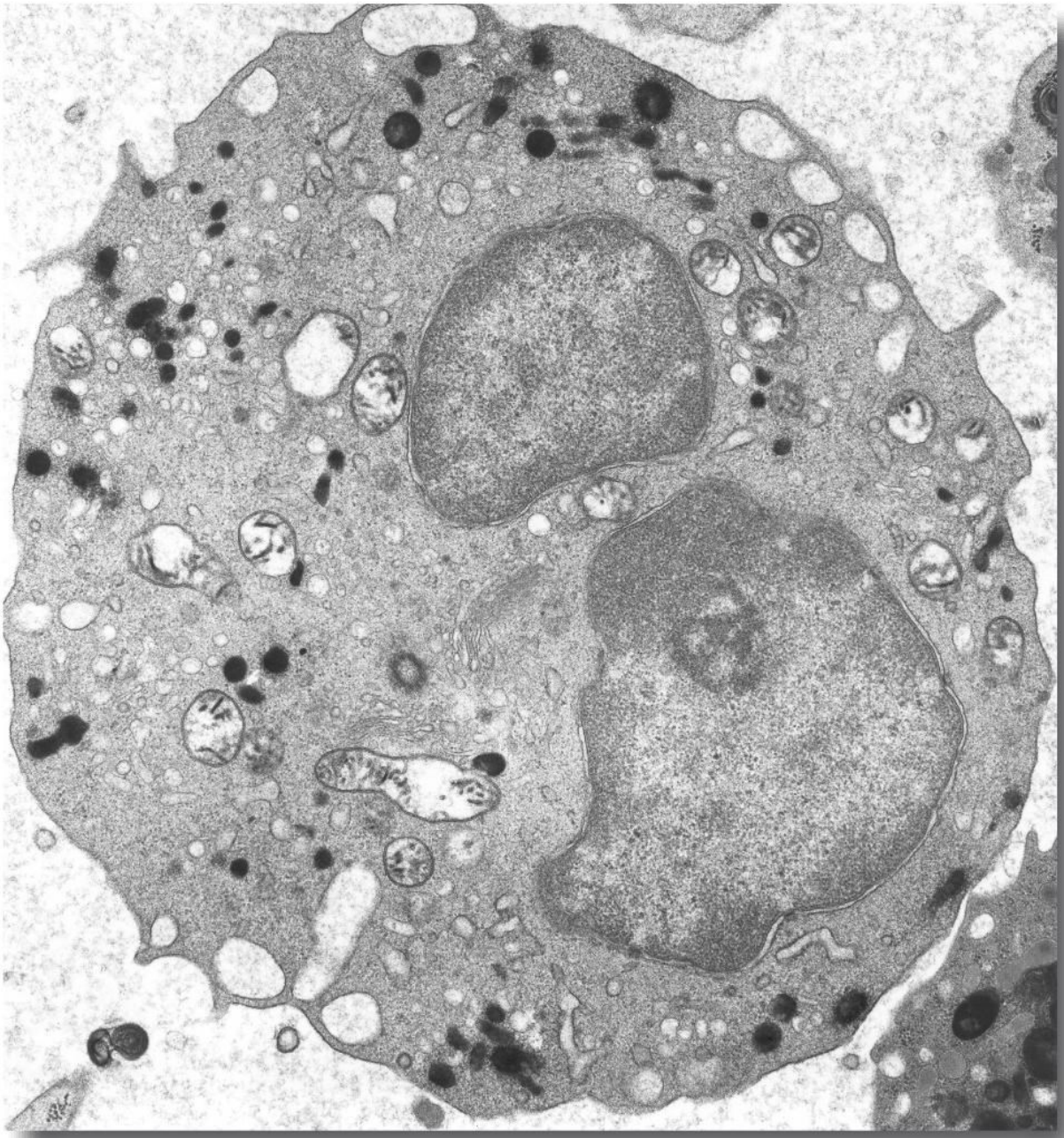
Prófase



Pró-Metáfase



Metáfase



Anáfase - Telófase